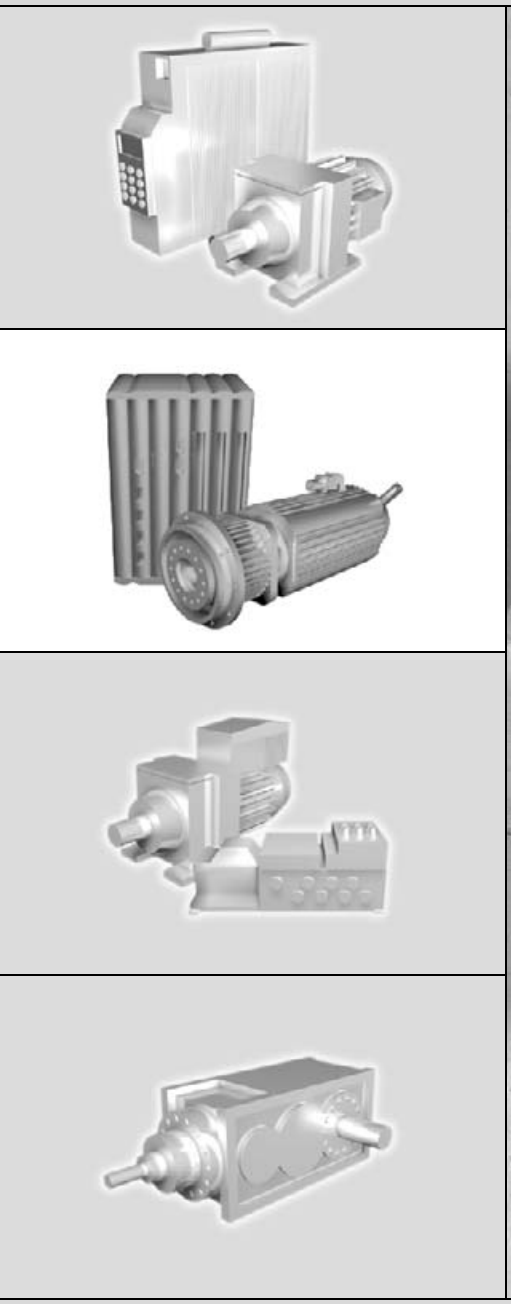
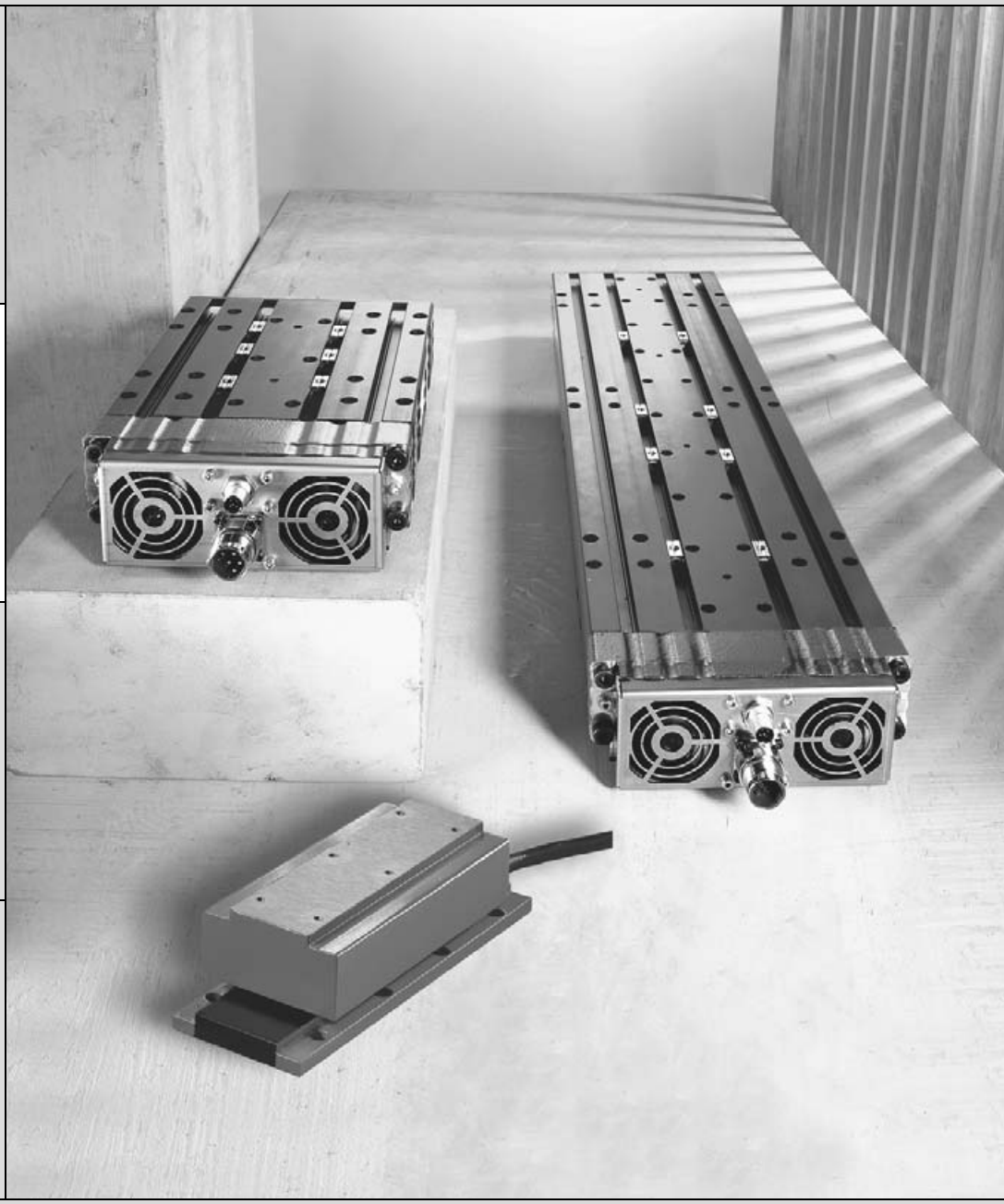
SEW EURODRIVE





SL2 Synchronous Linear Motors

GC441000

Edition 04/2005
11326417 / EN

Operating Instructions

SEW
EURODRIVE

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1 Important Notes

Safety and warning notes

Hazard

Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

Warning

Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury. You will also find this signal to indicate property damage accidents including personal injury risk appropriate to this level.

Caution

Indicates a potentially hazardous situation which, if not avoided, MAY result in minor injury or damage to products.

Note

Indicates a reference on the application, such as regarding installation, or other useful information.

Documentation reference

SEW-EURODRIVE GmbH & Co KG refers you to existing documentation, such as: operating instructions, catalog or data sheet.

A requirement of fault-free operation and fulfillment of any rights to claim under guarantee is that you adhere to the information in the operating instructions. Consequently, read the operating instructions before you start operating the drive!

The operating instructions contain important information about servicing and should be kept close to the unit.

Designated use

Series SL2 linear motors are units run by motors for industrial and commercial systems. Motor utilization other than that specified and areas of application other than industrial and commercial systems can only be used after consultation with SEW-EURODRIVE.

Do not start up the unit (take it into operation in the designated fashion) until you have established that the machine complies with the EMC Directive 89/336/EEC and that the conformity of the end product has been determined in accordance with the Machinery Directive 89/392/EEC (with reference to EN 60204).

Operational environment

The following uses are forbidden unless measures are expressly taken to make them possible:

- Use in explosion-proof areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation. Please contact SEW-EURODRIVE if you have any questions on the environmental operating conditions.
- Use in non-stationary applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN 50178.

Safety functions

Series SL2 linear motors may not execute any safety functions without master safety systems.

Use such higher-level safety systems to ensure protection of equipment and personnel.

Qualified personnel

SL2 linear motors represent a potential hazard for persons and material. Consequently, assembly, installation, startup and service work may only be performed by trained personnel who are aware of the potential hazards.

The personnel must be appropriately qualified for the task in hand and must be familiar with the assembly, installation, startup and operation of the product. The personnel must read the operating instructions, in particular the safety notes section, carefully and ensure that they understand and comply with them.

Liability for defects

Incorrect handling or any action performed that is not specified in these operating instructions could impair the properties of the product. In this case, you lose any right to claim under limited warranty against SEW-EURODRIVE GmbH & Co KG.

Product names and trademarks

The brands and product names contained within these operating instructions are trademarks or registered trademarks of the titleholders.

Disassembly and waste disposal

- Complete or partial recycling of the operator terminal is subject to local regulations.
- Note that the following components contain substances that may represent a health hazard and cause environmental pollution: Lithium battery, electrolyte condensers and display.

2 Safety Notes

Preface

Due to the strong permanent magnets installed in the secondaries of the SL2 linear motors, the following safety regulations must be observed.

Work not to be carried out by persons with cardiac pacemakers!

The strong magnetic fields and the associated high ferromagnetic attraction forces can be harmful to your health directly, for example for persons with cardiac pacemakers, or indirectly through fast motor movements and high thrust forces.

Based on current medical knowledge, magnetic fields with a flux density of < 5 mT have no effect on the human body.

Hazard caused by magnetic field!

Even at a distance of 100 mm, the magnetic flux density of the present secondaries is < 5 mT (at 150 mm < 0.5 mT). Since the magnetic flux density in SL2 linear motors is generated exclusively by the magnetic fields of the secondaries, this value is independent of the operating status of the SL2 linear motor.

Special caution is required in close proximity (distances < 50 mm) to the secondaries due to the high attraction forces. Magnetic forces are often underestimated since they are not visible.

Magnetic attraction forces often start abruptly in the immediate proximity range and can grow in excess of several 100 kg for medium-sized objects.

Please also consider the supplementary safety notes in the individual sections of these operating instructions.

General information

Burns hazard!

Touching the SL2 linear motor when it has not been cooled can result in burns. The SL2 linear motor can have a surface temperature of over 100 °C.

To prevent burns:

- Never touch the SL2 linear motor during operation or in the cool down phase once it has been switched off.

All work related to transport, putting into storage, setting up/mounting, connection, startup, maintenance and repair is to be carried out by trained personnel only. Note the following important points.

- Pay attention to the danger and safety signs on the SL2 linear motor.
- Do not go near the secondary with metallic objects that are heavy (> 1 kg) or have a wide surface (> 1 dm²) in your hand.
- Place at least two pointed wedges made of firm, non-magnetic material - such as brass or stainless steel (wedge angle ca. 10° - 15°) and a hammer ready to separate the adhering magnetic parts. If necessary, e.g. if mounting space is limited, customized installation appliances should be used to facilitate and safeguard work. To free parts of the body that have been trapped, separate adhering parts by driving the prepared pointed wedges (made of firm, non-magnetic material) into the separation gap.
- Do not bring watches and magnetizable data carriers (such as credit cards, disks, etc.) into close proximity < 100 mm of the SL2 linear motors.
- Note the system-specific guidelines and requirements.
- Note the national/regional regulations governing safety and the prevention of accidents.

Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protection covers or the housing

Designated use

These electric motors are intended for industrial systems. The drives comply with the applicable standards and regulations and meet the requirements of the Low Voltage Directive 73/23/EEC.

Technical data and information about the permitted conditions can be found on the nameplate and in the documentation.

It is essential to observe all the specified information!

Transport/ storage

Inspect the shipment for any damage in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.

Use suitable, sufficiently rated handling equipment if necessary. Remove securing devices used for transportation prior to startup.

Follow the instructions in the section "Notes on transportation"!

- Mark the storage locations of secondaries ("Danger! Strong magnetic fields", pictograms).
- Never store secondaries unpacked; use non-magnetic packaging material with a thickness of at least 2 cm on the magnetic side!
- Observe the warning instructions on the packaging.
- Keep storage area dry.
- Protect storage site from heat.
- For transportation of machines or components with primaries or secondaries already installed on travel axle(s): Lock the axle(s) to prevent accidental movement (due to missing self-locking mechanism).

Follow the instructions in the section "Transportation and storage"!

Installation / assembly

Hazard caused by magnetic field!

- Never place secondaries on metal.
- Never place a primary directly on a secondary.
- Hold the tools tight (with both hands). Slowly guide the tools to the secondary.
- Wear work gloves during assembly.
- Do not remove the packaging of the secondary until directly before it is installed.
- Carry out installation work in pairs only.
- Cover already installed secondaries with at least 2 cm of non-magnetic material (e.g. wood) during installation.
- Use customized installation appliances to facilitate and safeguard work, if necessary (e.g. if mounting space is limited).
- Make sure that the primary is grounded according to regulations via the PE grounding bar in control cabinet as a reference potential.

Please attach the enclosed warning sign in a prominent position or in the vicinity of the secondaries!

Follow the instructions in Sec. \"Mechanical Installation"!

Startup

- Never work in the travel range when the machine is switched on.
- Ensure free axle travel.
- Check the final positions.
- Check the linear measuring system prior to turning on the machine.
- Limit the maximum power in the servo controller.
- Set the velocity limits in the servo controller to small values.

Follow the instructions in the section "Startup"!

Operation and inspection / maintenance

Danger of electric shock!

Induced voltages of up to 500 V can be generated by movement of the primary (generator principle) even if the motor is not connected.

Only remove the protection cap on the power plug of the primary immediately before connecting the power plug to the power supply.

To prevent electric shocks:

- **After separating the servo controller from the supply voltage, wait for at least five minutes before you touch any live parts (e.g. contacts, stud bolts) or loosen connections. To be on the safe side, measure the voltage on the DC link and wait until the voltage has dropped below 40 V.**
- Keep motor area free from chips.
- Notice any noises.
- The motors may have a surface temperature of 100 °C during operation. Wait for the motor to cool down to 40 °C before touching it.
- Power connections can conduct voltages even if the motor does not turn. Never disconnect electrical connections of motors while they are energized.
- Wear work gloves when carrying out maintenance and repair work.
- Ensure safe disconnection from the voltage supply before working on the machine.
- Never work in the travel range when the machine is switched on.
- Remove any chips from the motor area on a regular basis.

Follow the instructions in the section "Startup and Maintenance"!

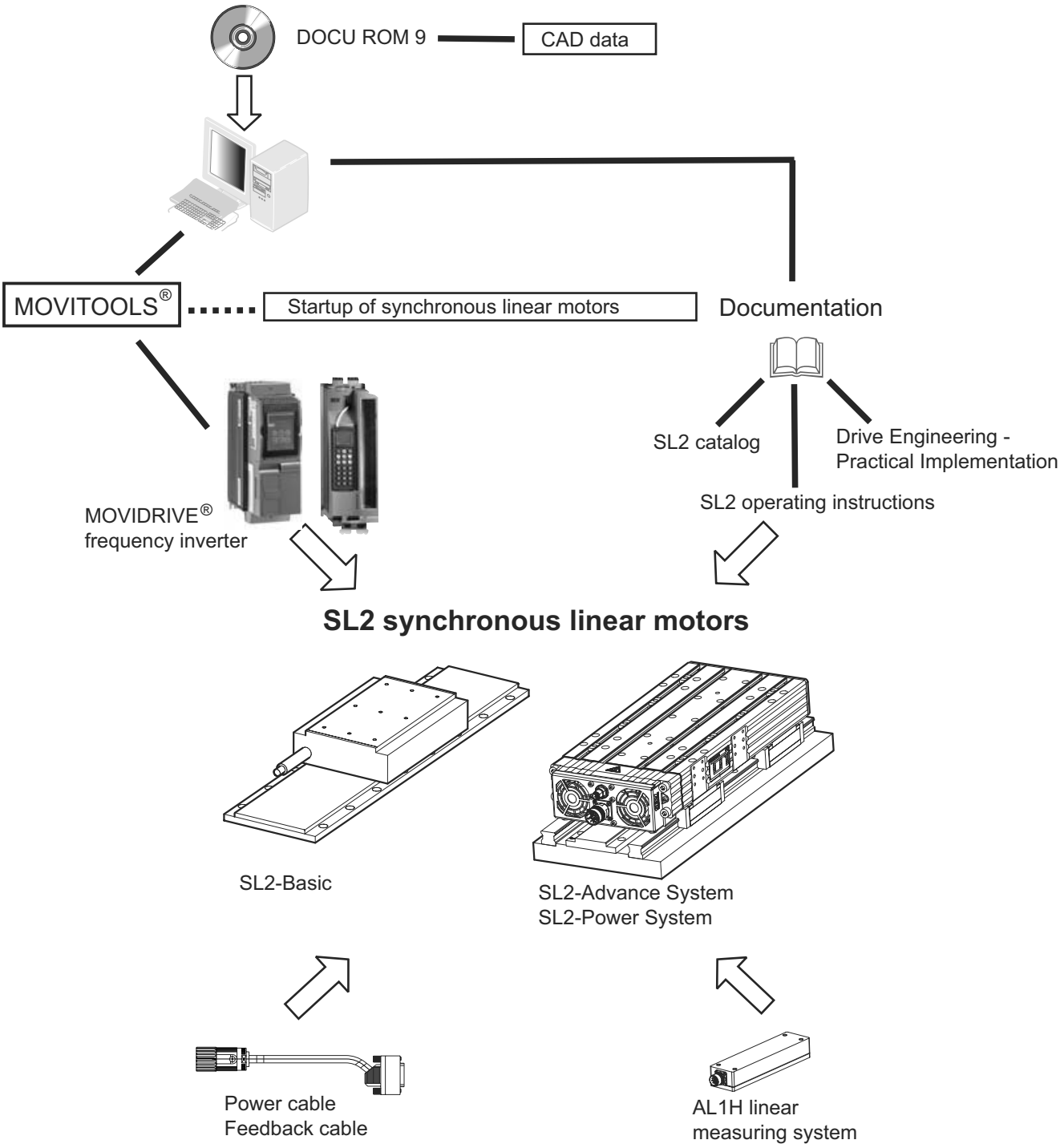
Behavior and immediate measures in case of ACCIDENTS

- Press the EMERGENCY OFF button in case the machine is connected to the power supply system.
- Request first aid immediately.
- You need the tools mentioned previously to free body parts jammed in between two secondaries or a secondary and a ferromagnetic component (e.g. steel plate, steel carrier, machine bed, tool). Separate the components at the separation gap using the pointed wedge.

The magnetic forces are always present regardless of the operating status of the system!

3 Product Description and Overview of Types

3.1 System environment



3.2 Documentation

- MOVIDRIVE®*compact* manual
- MOVIDRIVE® B manual
- "SL2 Synchronous Linear Motors" catalog
- "SL2 Synchronous Linear Motors" AWTec

3.3 SL2 Product designs

SEW-EURODRIVE offers **three** product designs for SL2 linear motors:

SL2-Basic	Motor package and secondaries
SL2-Advance System	Motor package integrated in cooling unit and secondaries. Prepared for installation of linear guides and the linear encoder.
SL2-Power System	Motor package integrated in motor cooling unit with forced cooling fan and secondaries. Prepared for installation of linear guides and the linear encoder.

SL2-Basic

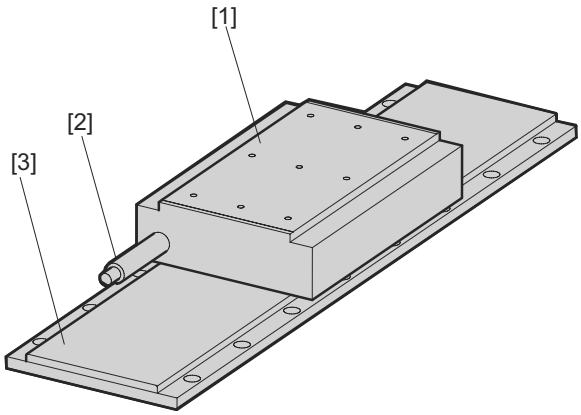


Figure 1: SL2-Basic synchronous linear motor

[1] Primary
[2] Electrical connection in form of a cable extension
[3] Secondary with permanent magnets

SL2-Advance System / SL2-Power System

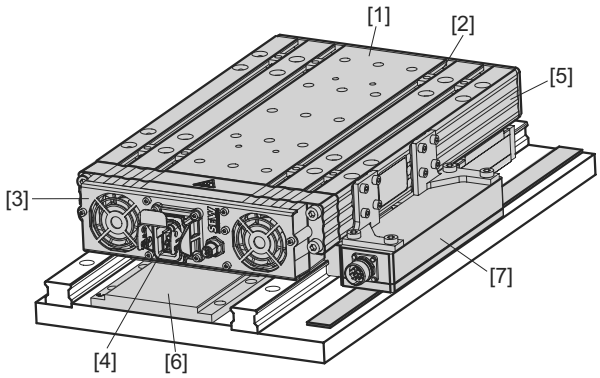


Figure 2: SL2- Advance System and SL2-Power System synchronous linear motor

[1] Optional motor cooling unit
[2] Prepared slots as retaining system for customer setup
[3] Forced cooling fan of optional motor cooling unit
[4] Electrical plug connector
[5] Primary (not visible) installed in motor cooling unit
[6] Secondary
[7] Linear measuring system

3.4 System components for SL2-Advance System and SL2-Power System

System description

The SL2 linear motor is installed into a motor cooling unit at the factory for product groups SL2-Advance System and SL2-Power System.

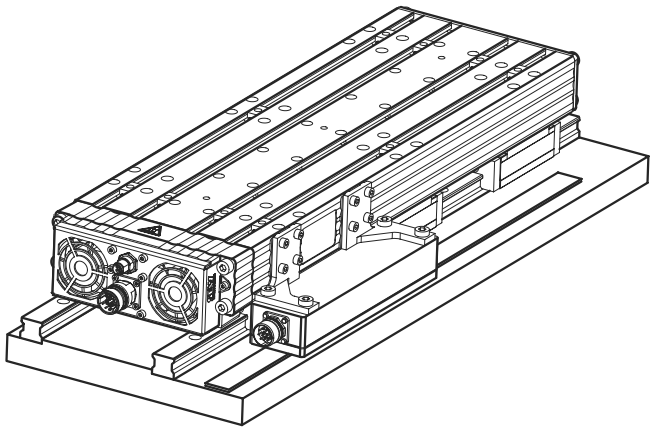


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Figure 3: SL2-Advance System or SL2-Power System with optional linear measuring system AL1H

For motor sizes

- SL2-P050,
- SL2-P100,
- SL2-P150

the motor cooling unit is available for all lengths (except for SL2-P150VS) as system components.

Part drawing of the SL2-Advance System and SL2-Power System

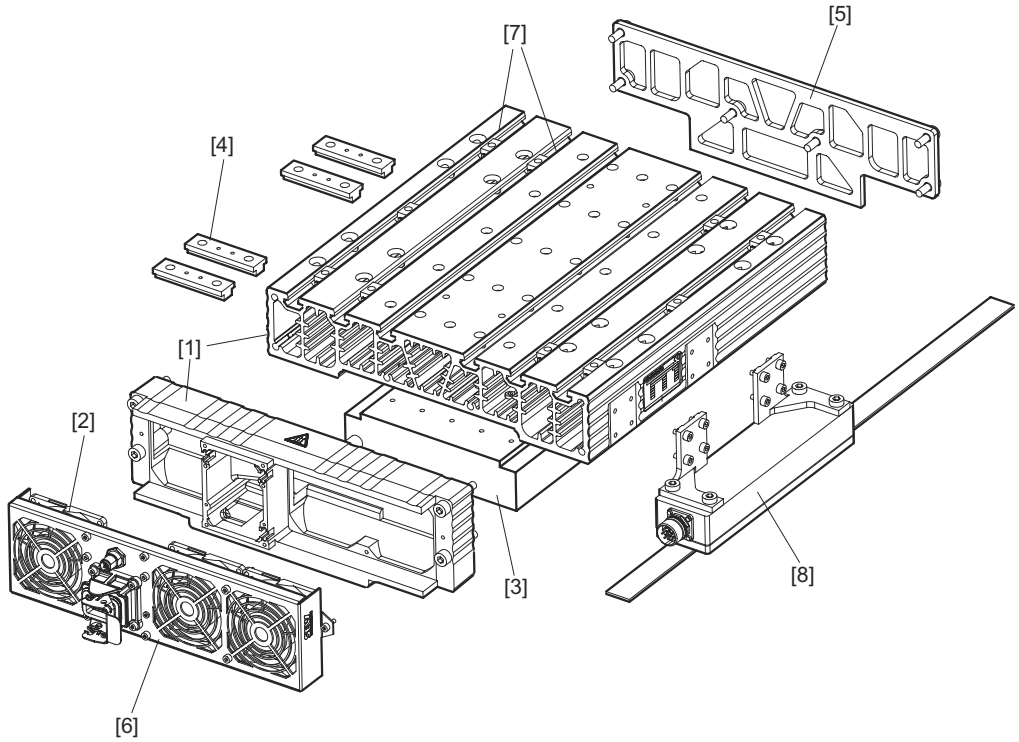


Figure 4: Motor cooling unit of the SL2-150S Power System

[1] Motor cooling unit
[2] Forced cooling fan (in SL2-Power System only)
[3] Primary
[4] Integrated floating bearing for temperature compensation
[5] End plate
[6] Front panel with power plug and fan guard
[7] Slots for installation of components by customer (T-slot nuts supplied)
[8] Linear measuring system

Design of the subsystems

The motor is installed into the motor cooling unit by SEW-EURODRIVE and connected to a standardized power plug. The 24V power supply for the fans is provided by a separate plug when using forced cooling fans.

Fields of application for the SL2-Power System

The use of the motor cooling unit with forced cooling fans is limited to enclosure IP54.

Fields of application for the SL2-Advance System

The SL2-Advance System can basically be used in all fields of application for the SL2 linear motor. There are no limitations.

For use in hoists!

The motor system is not equipped with its own holding brake. An absolute value measuring system is absolutely necessary when using the system as hoist drive. You will find additional information in section 5 of the "SL2 Synchronous Linear Motors" catalog.

3.5 Type code

The following example illustrates the structure for the type code.

Primary

SL2 - P 050 VS - 030 - T - B - KVX1 - 490 - 00

Standard / Special design

Winding voltage
DC link voltage 490 V
Cable extension (SL2-Basic)
For more information on the position and length, see the following page (combination overview 1)

or plug connector (SL2-Power System and SL2-Advance System) position, special design, see the following page (combination overview 2)

Motor design
B = SL2-Basic
A = SL2-Advance System
P = SL2-Power System

T = Temperature sensor TF / K = KTY

V_{rated}: 010 = 1 m/s; **030 = 3 m/s**; 060 = 6 m/s

Length of primary
VS = very short
S = short
M = medium
ML = medium long

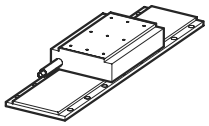
Active width of the primary:
50 mm, 100 mm, 150 mm, 200 mm or 250 mm.

Primary

Second generation of synchronous linear motor

The standard design appears in bold.

Combination overview 1 for SL2-Basic/cable extension



SL2-P...-...-K V X 1-...

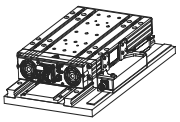
Length of cable extension in [m]
1 m = standard
2 m = optional
4 m = optional

Position of cable outlet
X = standard

Electrical connection
V = connected

K = Cable extension

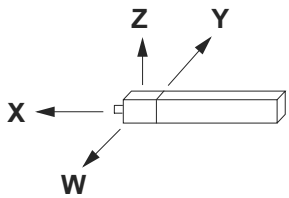
Combination overview 2 for SL2-Advance and SL2-Power System / connector position



SL2-P...-...-S S X S-...

Special design
S = Standard

Position of connector
X = Standard (Y, Z, W)



The following combinations of motor + connector position are not available:
- SL2-050 Power System with connector position Z[1)]
- SL2-100 Power System with connector position W[1)]
- SL2-150 Power System with connector position Z[1)]

Mechanical design
S = Standard

Connector

1) Interference with M12 24 V connector

The standard design appears in bold.

Secondary

SL2 - S 050 - 128

- Length of secondary
  64 mm, 128 mm, 256 mm and **512** mm
- Active magnet width of the secondary
  50 mm, 100 mm, 150 mm, 200 mm and 250 mm
- Secondary
- Second generation of synchronous linear motor

Linear measuring system

A L 1 H

- HIPERFACE® interface
- Version
- Linear measuring system
- Absolute encoder

The standard design appears in bold.

3.6 Nameplate

Labels are attached to the primaries and secondaries that show the technical data as follows:

SL2-Basic nameplate

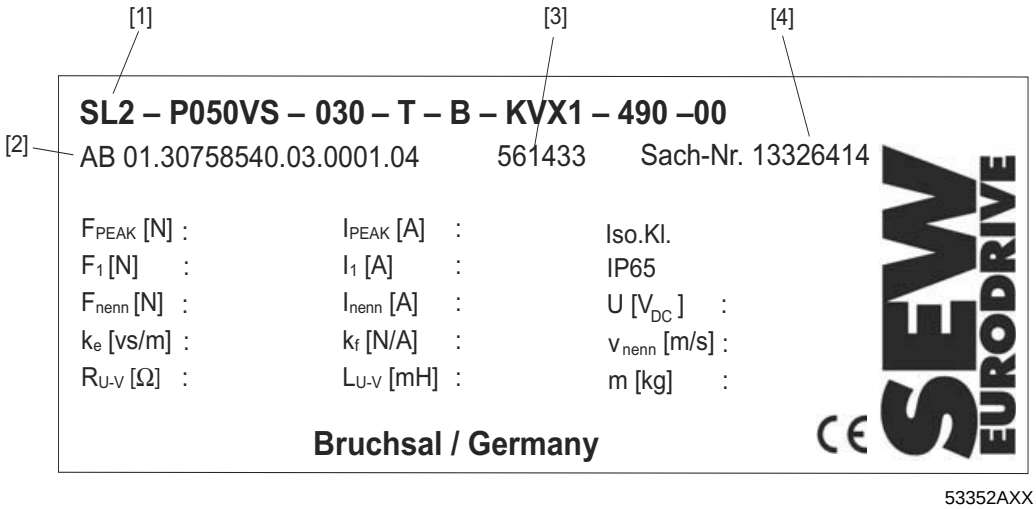


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Figure 5: Nameplate

[1]	=	Type code
[2]	=	Customer order number
[3]	=	Production number
[4]	=	Part number
F_{PEAK}	=	Peak force
F_1	=	Maximum force available up to v_1
F_{nenn}	=	Permanent force
k_e	=	Voltage constant
R_{U-V}	=	Winding resistance
I_{PEAK}	=	Maximum current
I_1	=	Current at F_1
I_{nenn}	=	Rated current
k_f	=	Force factor
L_{U-V}	=	Inductance
Iso.KL.	=	Insulating material class
IP	=	Enclosure
U	=	Voltage
v_{nenn}	=	Velocity up to which the rated force is available
m	=	Mass

SL2-Advance System / SL2-Power System nameplate

SEW-EURODRIVE CE

Typ	SL2-P050S-030-T-P-SSXS-490-00				
Fab.Nr.	01.123456789001.0001.01				
F_{peak} [N]	1300	I_{peak} [A]	11,8	Sach-Nr.	12345678
F_1 [N]	1000	I_1 [A]	8,7	Iso.Cl.	B
F_{nenn} [N]	730	I_{nenn} [A]	5,9	IP	54
k_e [vs/m]	76	k_f [N/A]	131	U [V_{DC}]	490
R_{U-V} [Ω]	7,0	L_{U-V} [mH]	45	v_{nenn} [m/s]	3,0
				m [kg]	12,3

Bruchsal/Germany

1332 783 6.50

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Figure 6: Nameplate

Type	=	Type code
Fab.Nr.	=	Customer order number
F_{PEAK}	=	Peak force
F_1	=	Maximum force available up to v_1
F_{nenn}	=	Permanent force
k_e	=	Voltage constant
R_{U-V}	=	Winding resistance
I_{PEAK}	=	Maximum current
I_1	=	Current at F_1
I_{nenn}	=	Rated current
k_f	=	Force factor
L_{U-V}	=	Inductance
Sach-Nr.	=	Part number
Iso.CL.	=	Insulating material class
IP	=	Enclosure
U	=	Voltage
v_{nenn}	=	Velocity up to which the rated force is available
m	=	Mass

Nameplate secondary

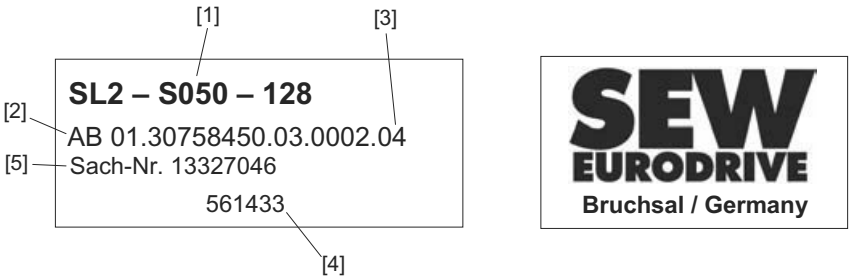

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Figure 7: Nameplate

[1]	=	Type code
[2]	=	Customer order number
[3]	=	Date of production
[4]	=	Production number
[5]	=	Part number

3.7 Scope of delivery for system components

The scope of delivery for SL2 linear motors comprises:

- Primaries
- Secondaries with permanent magnets
- SL2-Advance System
  - Primary installed in motor cooling unit
  - Electrical plug connector
  - T-slot nuts for mounting of customer loads are included
- SL2-Power System
  - Primary installed in motor cooling unit
  - Electrical plug connector
  - Forced cooling fan fully assembled and electrically wired to M12 plug connector
  - T-slot nuts for mounting of customer loads are included
- Prefabricated power and feedback cables
- Control and regulation systems such as MOVIDRIVE®
- Linear measuring system
- Encoder mount-on components

Not included in the scope of delivery:

- Linear guide systems
- Linear measurement systems (except for AL1H)
- Cable carriers
- Brake systems
- Buffer/shock absorber

4 Transportation and Storage

4.1 Transportation

SL2-Basic primaries

Primaries of the SL2-Basic

- SL2-P100M/ML
- SL2-P150S/M/ML
- SL2-P200S/M/ML
- SL2-P250VS/S/M/ML

with a net weight of more than 18 kg are equipped with the following transportation aids:

1. Packaged primary

STOP

Transportation of the packaged primary with the attached crane slings only. The weight of the primary is indicated on the nameplate or the dimension sheet.

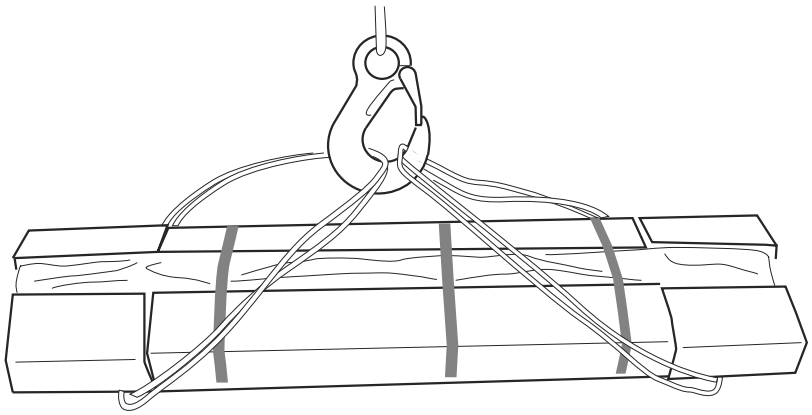

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Figure 8: Packaged SL2-Basic primary

2. Unpacked primary

STOP

The primary is equipped with two M6 threads for transportation with lifting eyebolts (parts not included in scope of delivery) for further transportation or handling.

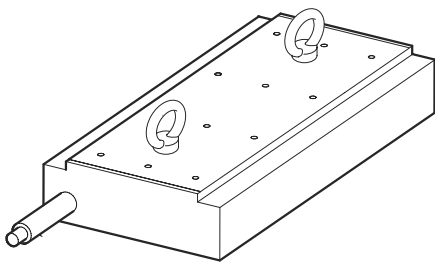

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Figure 9: Lifting eyebolts with SL2-Basic primary

SL2-Advance System / SL2-Power System primaries

The primaries of the SL2-Advance Systems / SL2-Power Systems

- SL2-P050M/ML
- SL2-P100S/M/ML
- SL2-P150S/M/ML

with a net weight of more than 18 kg can be removed from the box using a hoist.

1. Unpacked primary

STOP

The T-slot nuts on the motor cooling unit are equipped with two M8 lifting eye-bolts (parts not included in scope of delivery) for further transportation or handling.

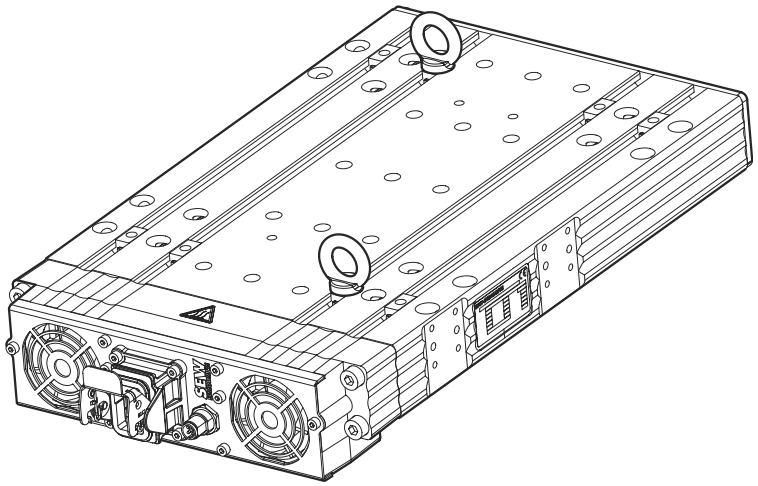

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Figure 10: Transportation of the SL2-Advance System / SL2-Power System

4.2 Packaging

Protective cover may not be damaged since it ensures corrosion protection of metal parts.

Primaries

Primaries of size:

- SL2-P050
- SL2-P100
- SL2-P150

are packaged as follows:

1. Cable extension

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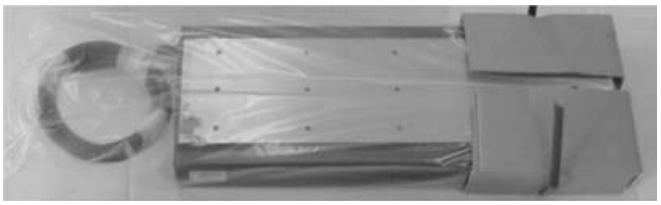
Figure 11: Cable extension

2. Bag / corrosion protection



53322AXX

Figure 12: Bag/corrosion protection

3. Completely packaged in carton with nameplate

53323AXX

Figure 13: Packaged primary

Primaries of size:

- SL2-P150
- SL2-P200
- SL2-P250

are packaged as follows:

1. Cable extension

53321AXX

Figure 14: Cable extension

2. Bag/corrosion protection

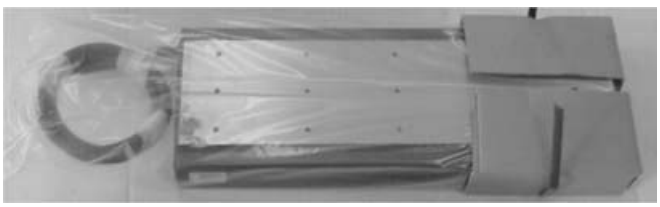


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Figure 15: Bag/corrosion protection

3. Completely package in carton with plywood support or transport slings

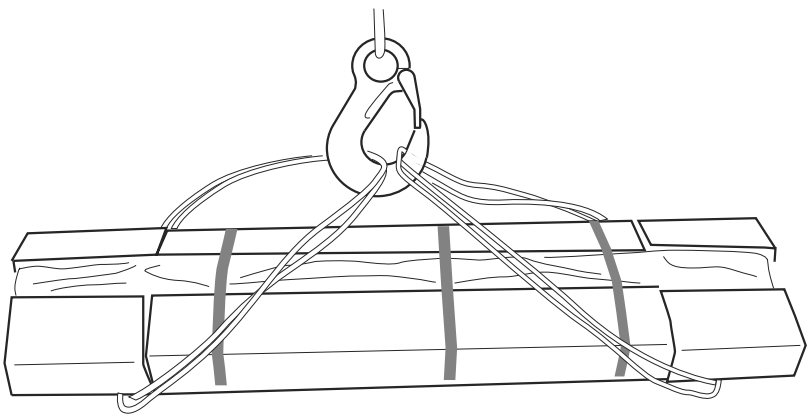

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Figure 16: Packaged primary

Secondary for all motor types

Protective cover must not be damaged since it ensures corrosion protection of metal parts.

1. Box with packaging straps

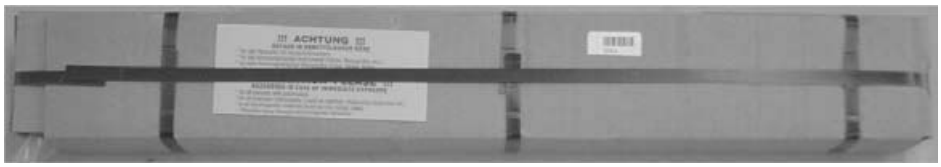

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Figure 17: Box

2. Contents secondary box:
   - Secondary packed in protective cover
   - Safety notes and warning labels enclosed loose inside box
   - Touch guard magnetic surface (wooden board)

4.3 Corrosion protection and storage conditions

The motor parts are protected against corrosion for five years in closed original packaging.

Observe the following storage conditions for SL2 linear motors:

- Store the SL2 linear motors inside.
- Keep storage area clean and dry.
- Storage temperature should be between –5 °C and +70 °C.
- Relative humidity not to exceed 95 %
- Original packaging free from damages

Stored SL2 linear motors must be equipped with the following warning labels:

- Warning

- Magnetic

.

4.4 Coating

SL2-Basic The motor parts are coated black matte (EPOXY two-component single coat paint) as standard.

SL2-Advance System / SL2-Power System With the exception of the front area, all motor parts are anodized with black paint. The front side of the motor is coated with black matte.

4.5 Return delivery to SEW-EURODRIVE

Return primary and secondary components in original packaging only.

Cover the magnetic side of the secondaries with a wooden board (thickness 2 cm) over the entire surface and connect.

5 Mechanical Installation

It is essential to comply with the safety notes in Section 2 during installation!

5.1 Installation tolerances

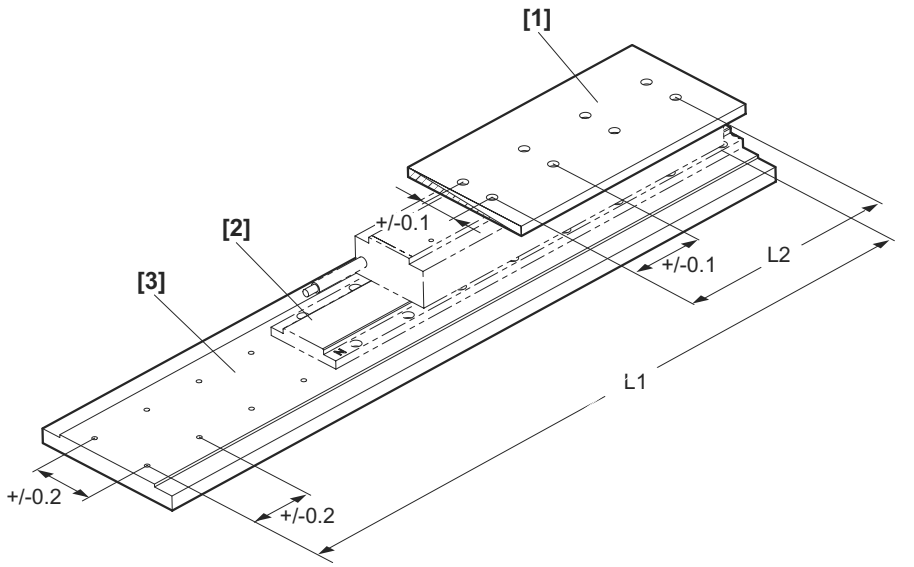

Figure 18: Tolerances

[1] Installation of primary

in reference to the largest primary, max. deflection length / width 0.1 mm

[2] Secondary

in reference to 512 mm length, max. deflection 0.1 mm

[3] Installation of secondary

[L1] ± 0.3 mm in reference to total length

[L2] ± 0.2 mm in reference to total length

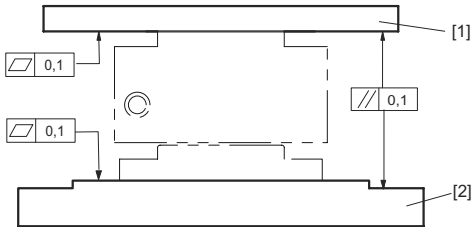

Figure 19: Tolerance of position for entire unit

[1] Installation of primary (mounting plate)
[2] Installation of secondary (basic body, e.g. machine base)

Shape and position tolerances in reference to 1000 mm length

The shape and position tolerances must be observed for the function of the SL2 linear motor. Depending on the used measuring system, it may be necessary to have a greater accuracy of the mounted parts for safe operation. These accuracies are sufficient for the functionality of the AL1H encoder system.

These shape and position tolerances will have to be observed in operating mode at steady-state temperature of the SL2 linear motor. You will also have to take into consideration the influence of the loads installed by the customer.

5.2 Required tools / aids

- Standard tool
- Operation with conductor end sleeves: Crimping tool and conductor end sleeves (without insulation shroud, DIN 46228, Part 1, Material E-Cu)
- Crimping tool for plug connectors

5.3 Installation of the SL2-Basic

Before you begin Check that

- the information on the nameplate of the drive and/or the output voltage of the servo controller match the voltage supply system,
- The drive is undamaged (no damage caused by transportation or storage).
- It is certain that the following requirements have been met:
  - Ambient temperature between +5 °C and +40 °C[1)]
  - No oil, acid, gas, vapors, radiation, etc.
  - Installation altitude max. 1000 m above sea level.[1)]

Start with the installation of the primary. Install the secondaries after having concluded all other installation work immediately prior to startup of the drive. Observe the safety notes when handling the secondaries (see section 2).

1) Note the derating data in section 4.9 of the SL2 Synchronous Linear Motor catalog.

Preparing the SL2-Basic primary for installation

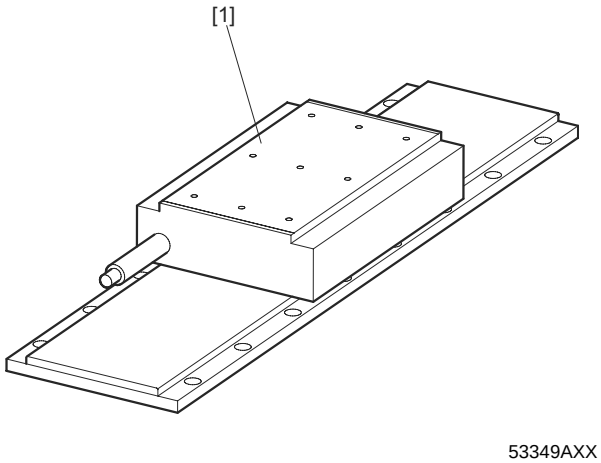

Figure 20: Primary SL2-Basic

Mounting surfaces [1]:

The mouting surfaces of the primary were treated with an anti-corrosion agent at the factory. Do not remove this protection layer. Wipe the surface with a lint free cloth to remove any dust, dirt, etc. clinging to the surface.

Retaining screws:

Use **all** M5 tapped holes in the mouting surface to fasten the unit. Use screws of size M5, strength class 8.8 or higher. The minimum depth of engagement is 8 mm. The tightening torque is always 6 Nm and may not be exceeded, even with screws of a higher strength class.

5.4 Installation of the SL2-Advance System and SL2-Power System

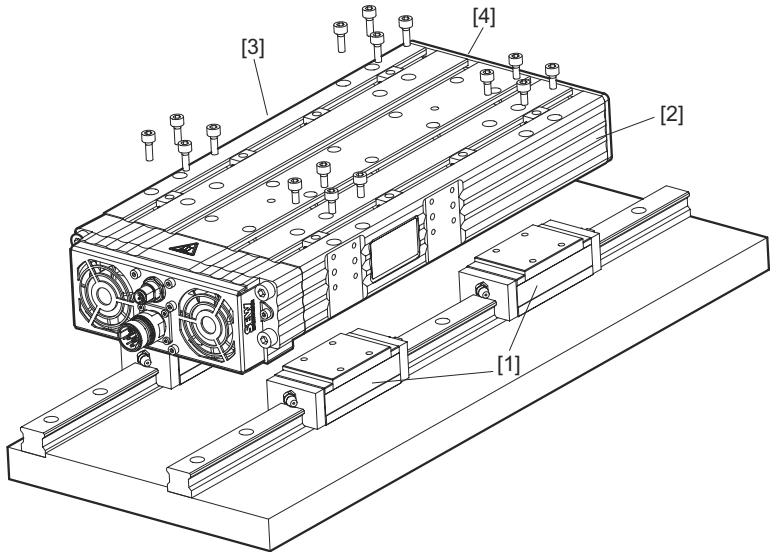

Figure 21: Installing the primary on the guide system

[1] Guide carriage
[2] Fixed bearing end
[3] Floating bearing end
[4] End plate

The SL2-Advance System and SL2-Power System are screwed onto the guide carriage [1]. Bores for cylinder screws to DIN EN ISO 4762 (previously DIN 912) are provided for this purpose on the primary housing (screws are not included in the scope of delivery).

Guide systems available for SL2-Advance System and SL2-Power System are listed in section 10.7.

This screw connection essentially determines the mechanical load capacity of the primary. Use screws of strength class 8.8 → Sec. 5.7.

Deviating loads of the screw connection must be determined in accordance with the standard calculation procedures used in mechanical engineering (VDI 2230). The customer loads and design of the guide system are included in the calculation.

The calculation basis must not exceed a maximum interface pressure under the screw head of 230 N/mm². The friction value μ_{head} under the screw head is 0.15.

Type		Screw size	Tightening torque [Nm]	Number of screws			
				VS	S	M	ML
SL2-050	Fix. bearing end [2]	M6x12	10	8	8	12	12
	Float. bearing end [3]	M6x16	10	8	8	12	12
SL2-100	Fix. bearing end [2]	M8x16	20	8	8	12	12
	Floating bearing end [3]	M8x20	20	8	8	12	12
SL2-150	Fix. bearing end [2]	M8x16	20		8	8	12
	Floating bearing end [3]	M8x20	20		8	8	12

Prerequisite for assembly

First assemble the guide system including the guide carriage according to the manufacturer's specifications. Note in particular the requirements regarding the accuracy of the mounting surfaces (→ Sec. 5.1 "Installation tolerances")

Starting the installation

Install the secondaries after having concluded all other installation work, immediately prior to startup of the drive. Observe the safety notes when handling the secondaries (see section 2 "Safety Notes").

Installing the primary

1. Wipe the surface of the primary lightly with a lint free cloth to remove any dust, dirt, etc.
2. Align the guide carriages [1] on the guide rails (→ see figure on the previous page) so that the primary can be installed.
3. Mount the guide carriage [1] Use suitable hoists for heavy parts (→ Sec. 4.1 Transportation)
4. Attach all the screws to connect the primary with the guide carriages [1]. Do not grease or oil the screws.

Use a magnetic hexagon socket tool to attach the screws. They prevent screws from falling out in unfavorable mounting positions. If screws fall inside the primary housing, it is essential that you remove them. The end plate [4] can be removed for easier access (see illustration on the previous page).

5. First tighten the screws at the fixed bearing end [2] in accordance with the tightening torque (see table on the previous page).
6. Then tighten the screws at the floating bearing end [3].

5.5 Installation of SL2 secondaries

Preparing the secondaries for installation

Caution! Do not unpack parts until you are ready for installation.

First prepare the M6 retaining threads in the machine base to install the secondaries.

The mouting surfaces of the secondary were treated with an anti-corrosion agent at the factory. Do not remove this protection layer. Wipe the surface with a lint free cloth to remove any dust, dirt, etc. clinging to the surface.

Installation of secondaries

Install the first part at one end of the travel distance and work your way down in one direction. The orientation of the first part can be random. The adjoining part will have the same orientation. The north [1] (N) and south [2] (S) poles are identified on the secondaries (→ see following illustration). You can combine secondaries of different lengths.

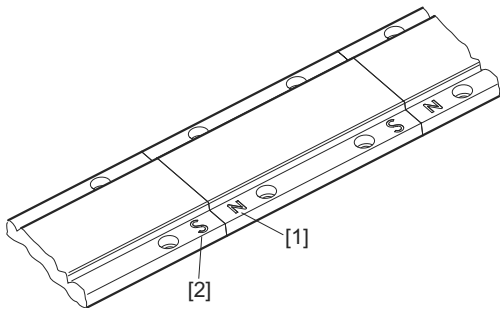

Figure 22: Arrangement of secondaries

[1] North pole
[2] South pole

Use **all** bores of the secondary for retaining purposes. Use screws of size M6, strength class 8.8 or higher. The engagement depth and tightening torque (generally 10 Nm) depend on the customer support structure.

Move primary over secondaries by hand prior to startup of drive to check for unhindered operation.

Use non-magnetic testing devices, such as feeler gauges made of stainless steel, aluminum, brass or copper sheets if you are planning to check the visible air gap.

Induced voltages of up to 500 V can be generated by movement of the primary (generator principle) even if the motor is not connected.

Only remove the protection cap on the power plug of the primary immediately before connecting the power plug to the power supply.

5.6 Installation of the AL1H measuring system

- It is essential that you read the manufacturer's operating instructions provided with the encoder system.
- Note for installation of the measuring tape [2] that the end identified by a dot [5] is stuck on in the direction of the connecting plug.

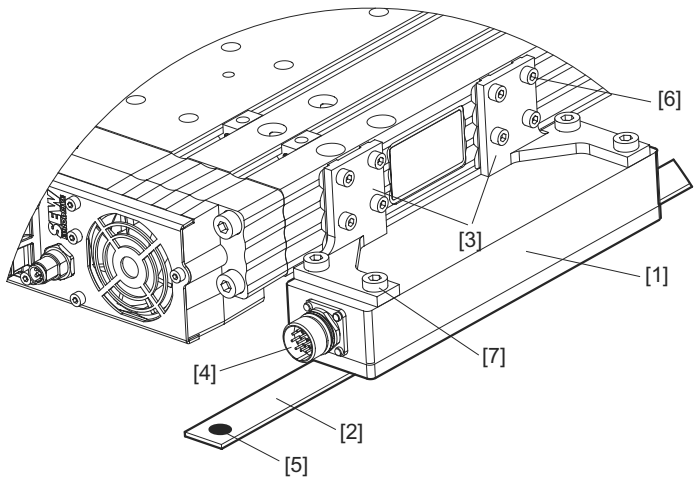

Figure 23:

[1] Linear sensor
[2] Measuring tape
[3] Encoder mount-on components
[4] Connection of the linear sensor
[5] Identification of the installation direction of the measuring tape
[6] Screws for the primary housing/mount-on components
[7] Screws for the linear sensor/mount-on components

Use the M8x20 non-magnetic stainless steel screws provided to connect the linear sensor with the mount-on components [7] → tightening torque 16 Nm.

Tighten the M5x12 screws lightly to connect the primary housing with the mount-on components [6] → maximum tightening torque 5 Nm.

5.7 Mechanical load capacity of the SL2-Advance System and SL2 -Power System

The permitted mechanical load capacity of the entire linear drive system is dependent on the size, position and type of the forces caused by the loads mounted by customers and the permitted loads from:

- Guide system
- Retaining screws for guide carriages on the cooling unit
- Cooling unit housing
- Loads mounted via slots/T-slot nuts

However, to help with the selection, the permitted loads have been reduced to simple applications and clear calculation models. Depending on the individual application, greater loads may occur. If necessary, please contact SEW-EURODRIVE for more information.

Check the previous points in each application.

Guide systems

The detailed project planning process for linear guide system must be performed together with the manufacturer of the guide system and is the responsibility of SEW-EURODRIVE.

Housing of the motor cooling unit

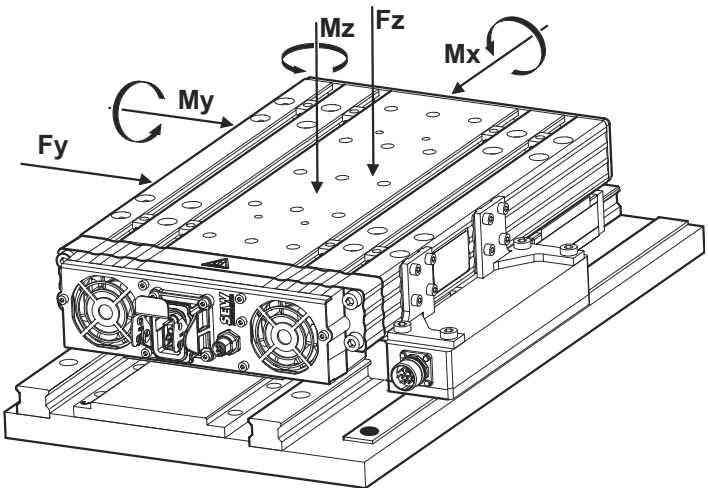

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Figure 24: Static load

[Mx] = permitted load torque on the X axis
[My] = permitted load torque on the Y axis
[Mz] = permitted load torque on the Z axis
[Fy] = permitted force in Y direction
[Fz] = permitted force in Z direction

The table (see below) shows the permitted static loads on the entire primary. The magnetic attraction forces between the primary and secondary are already taken into account.

The values in the following table apply to both directions for the forces and torque ratings.

The housing is only allowed to be subjected to one load value. If several forces/torques act on the housing at the same time, SEW-EURODRIVE can calculate the exact load bearing capacity of the motor cooling unit!

Motor type	Mx [Nm]	Fy [N]	My [Nm]	Fz [N]	Mz [Nm]
SL2-050VS	1500	1600	2500	12000	150
SL2-050S	1700	1800	4500	14000	220
SL2-050M	2500	2800	10000	20000	550
SL2-050ML	2800	3000	16000	20000	800
SL2-100VS	3400	3100	3200	12000	200
SL2-100S	3800	3400	8000	14000	400
SL2-100M	5500	5300	20000	20000	1000
SL2-100ML	5800	5700	32000	20000	1500
SL2-150S	5300	4000	10000	19000	400
SL2-150M	6000	4600	20000	26000	700
SL2-150ML	8500	6500	45000	32000	1800

5.8 Installation of customer components on primary

T-slot nuts are inserted in the primary housing at the factory for the installation of customer components. If required, the distribution of the T-slot nuts within the primary housing can be adapted. To do so, unscrew the end plate [4] (see figure in Sec. 5.4), insert the T-slot nuts in the required slot using a spring and screw the end panel plate on.

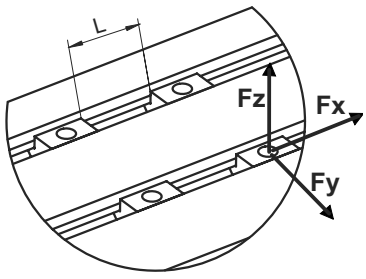

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Figure 25: Minimum distance [L] between the T-slot nuts

The design of the slot system is based on the modular profile system from Bosch/Rexroth so that components from this modular system or similar modular systems can be used.

Permitted static load for the slot:

In direction	Fz	12,000 N	(plastic deformation starts)
In direction	Fx	1000 N	
In direction	Fy	1000 N	

The rule of thumb is 1000 N (≈ 100 kg) per T-slot nut in every direction

As long as the minimum distance [L] between the T-slot nuts is observed, the T-slot nuts can be distributed as required within the customer mounting surface.

Motor type	Number of T-slot nuts enclosed	Min. distance (L) between the T-slot nuts [mm]
SL2-050VS	6	70
SL2-050S	8	80
SL2-050M	10	90
SL2-050ML	10	90
SL2-100VS	8	70
SL2-100S	8	80
SL2-100M	10	90
SL2-100ML	10	90
SL2-150S	10	80
SL2-150M	12	90
SL2-150ML	14	90

To make it easier for customers to install/remove loads, each cooling unit comes equipped with pin holes for positioning. Additionally, the T-slot nuts are secured to ensure that they do not shift.

Deviating loads of the screw connection for the T-slot nuts must be determined in accordance with the standard calculation procedures used in mechanical engineering (VDI 2230). The customer loads and design of the mount-on components are included in the calculation.

Generally, the permitted load of the primary is limited by the screw itself.

6 Electrical Installation

It is essential to comply with the safety notes in section 2 during installation!

Observe the wiring instructions issued by the manufacturer of the servo controller in case motors are powered by inverters. It is essential to observe the operating instructions for the servo controller.

6.1 SL2-Basic electrical connection

The current carrying capacity only applies to the SL2-Basic design with standard cable length 1m.

Cable extension type	1	2	3	4	5
Outer diameter [mm]	9.6	10.8	13	17.5	20.5
Conductors	4 x 1.5 + 1 x (2 x 0.5)	4 x 2.5 + 1 x (2 x 0.5)	4 x 4.0 + 1 x (2 x 0.5)	4 x 6.0 + 1 x (3 x 1.5)	4 x 10 + 1 x (3 x 1.5)
Load at ambient temperature 30 °C [A]	18	26	34	44	61
Load at ambient temperature 40 °C [A]	16	23	30	40	55
Load at ambient temperature 60 °C [A]	12	17	24	31	43
Color of power cores	Black	Black	Black	Black	Black
Identification phase U	1	1	1	U/L1	U/L1
Identification phase V	2	2	2	V/L2	V/L2
Identification phase W	3	3	3	W/L3	W/L3
Color protective earth	Green / yellow	Green / yellow	Green / yellow	Green / yellow	Green / yellow
Color thermistor core (TF1)	White	White	White	Black	Black
Color thermistor core (TF2)	Brown	Brown	Brown	Black	Black
Thermistor identification (TF1) PTC140	-	-	-	1	1
Thermistor identification (TF2) PTC140	-	-	-	2	2
Thermistor identification KTY-84 Anode	White	White	White	1	1
Thermistor identification KTY-84 Kathode	Brown	Brown	Brown	2	2
Minimum bending radius fixed routing [mm]	20	22	26	53	62
Minimum bending radius at constant motion [mm]	96	110	130	175	205

Project planning for cable cross section of the power cable

Cable dimensioning to EN 60402

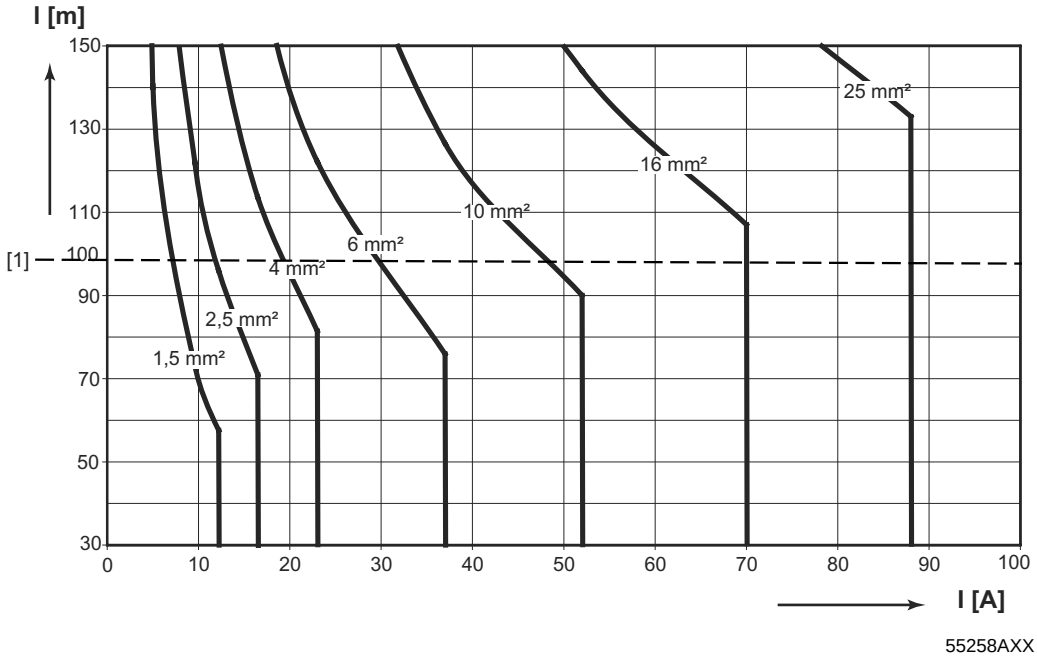


Figure 26: Minimum required cable cross section depending on cable length l [m] and current I]A[

[1] Max. permitted cable length to SEW specification = 100 m

The diagram (see above) is used as the basis for the cable assignment in sections 10.2 and 10.3.

Hybrid cables with cross sections of 1.5 mm^2 to 10 mm^2 can be ordered from SEW-EURODRIVE.

Cable load through current I in [A] according to EN 60204-1 table 5, ambient temperature 40 °C

Cable cross section [mm^2]	Three-core sheathed line in pipe or cable [A]	Three-core sheathed cable on top of each other on wall [A]	Three-core sheathed cable lined up horizontally [A]
1.5	12.2	15.2	16.1
2.5	16.5	21.0	22
4	23	28.0	30
6	29	36.0	37
10	40	50.0	52
16	53	66.0	70
25	67	84.0	88
35	83	104.0	114

These data are merely recommended values and are **no substitute for detailed project planning** of the cables depending on the actual application, taking the applicable regulations into account!

Safety notes

EMC measures

SEW-EURODRIVE SL2 synchronous linear motors are designed for use as components for installation in machinery and systems. The designer of the machine or system is responsible for complying with the EMC Directive 89/336/EEC. For more information on this topic, refer to the SEW publications:

"Drive Engineering Practical Implementation Volume 7, Project Planning for Drives" and "Drive Engineering Practical Implementation Volume 9 EMC in Drive Engineering"

Encoder connection

Please observe the following instructions when connecting an encoder:

- Use a shielded cable with twisted pair conductors only.
- Connect the shield to the PE potential on both ends over a large surface area.
- Route signal cables separately from power cables or brake cables (min. distance 200 mm).

TF evaluation unit

Risk of unwanted axis movements due to interference from parasitic signals (EMC) via the motor cable.

When synchronous SL2-... linear motors are combined with a MOVIDRIVE® *compact* MCH inverter, SEW-EURODRIVE strongly recommends that you use an external TF evaluation unit (e.g. EMT6-K from Möller or 3RN1011 from Siemens).

If you use the TF evaluation unit in MOVIDRIVE® *compact* MCH (analog input 1 AI11/AI12 at connector X10 of the connection unit), the TF cable should not be connected for reasons of safety.

During startup, set parameter P835 in the parameter menu to "No response." This ensures that the differential input AI11/AI12 is deactivated.

The evaluation of the external TF evaluation unit is performed separately via the PLC or via an external digital input on the MCH unit (e.g. connection X11, terminal 6 = DI05), which is set to "/Ext. fault" in parameter menu P60. This measure ensures fault-free and safe operation.

When SL2... linear motors are combined with MOVIDRIVE® B units, the TF can be evaluated directly on the servo controller without any risk of danger.

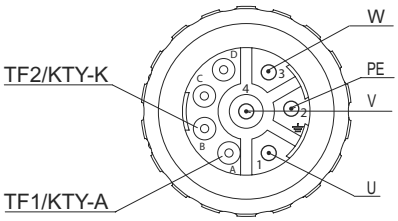
If you use a KTY temperature sensor (KTY84...140), it is essential that you contact SEW-EURODRIVE.

6.2 SL2-Advance System and SL2 -Power System electrical connection

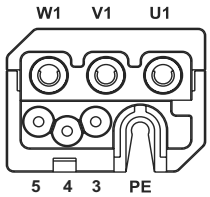
Pin assignment of the power connection for the SL2-Advance System and SL2 -Power System

The following pin assignments are described as viewed onto the motor.

Size SL2-P050

Contact	Assigned	Plug connector
1	U	**BEGA 089** 
4	V	
3	W	
2	PE	
A	TF1/KTY-A	
B	TF2/KTY-K	
C	n.c.	
D	n.c.	

Size SL2-P100, SL2-P150

Contact	Assigned	Plug connector
U1	U1	**C148U connector with socket contacts**
V1	V1	
W1	W1	
PE	Green/yellow	
3	n.c.	
4	(TF1)/KTY-A	
5	(TF2)/KTY-K	

Pin assignment for the power supply to the fan in the SL2-Power System

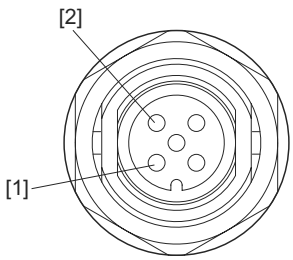


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Figure 27:

[1] Ground
[2] +24 V

6.3 Prefabricated cables for SL2-Advance System and SL2-Power System

Prefabricated power cables

For the motor designs

- SL2-Advance System
- SL2-Power System

SEW-EURODRIVE offers prefabricated power and feedback cables from 1 m to 100 m for straightforward and reliable connection.

The cable ends are fitted with cable lugs (for power cables) or conductor end sleeves. The shielding is connected to the mating connector.

Prefabricated power cables are used to connect the:

- Motor power
- Motor protection (TF or KTY)

Prefabricated feedback cables

SEW-EURODRIVE offers a feedback cable for the AL1H linear measuring system. The cable is fitted with plug connectors for connection to the encoder and the servo controller.

The cables are only available as cable carrier cables. Cables from the company Nexan are used.

SL2 unit designation

Power cables of the SL2-P050... motors correspond to the brake motor cables of the CM71 motor series with SB11 round plug connector of the SB71-74 servomotors.

The power cables for the motor sizes SL2-P100 and SL2-P150 correspond to the brake motor cables of the CM motor series with SB51-59 plug connectors.

Structure of power cables for SL2-050 motors

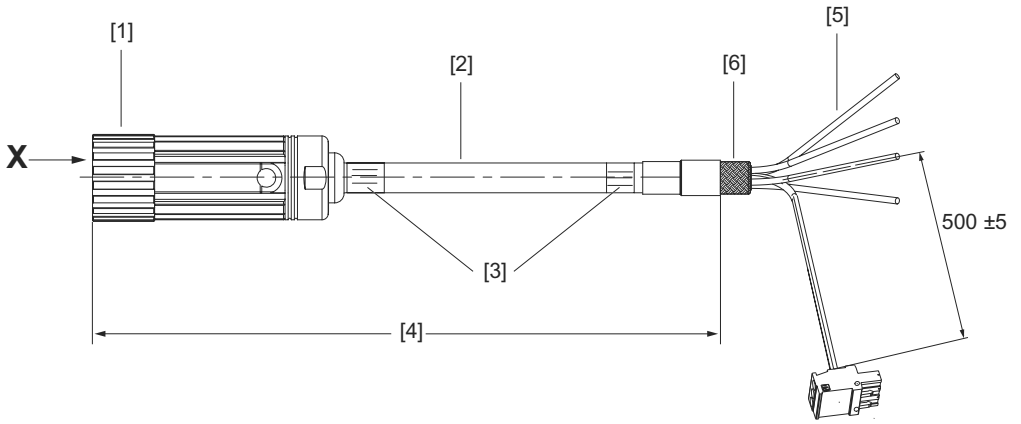


Figure 28: Power cables for SL2-050

[1] Connector: Intercontec BSTA 078
[2] SEW-EURODRIVE logo printed on cable
[3] Nameplate
[4] Line length ≤ 10 m: +200 mm tolerance
Line length ≥ 10 m: +2 % tolerance
Permitted line length according to the technical documents
[5] Prefabricated cable end for inverter
Required loose parts are supplied with the cable
[6] Shielding pulled back approx. 20 mm + 5 mm

Prefabricated cables for motor end

The power cables on the motor end consist of an 8-pin plug connector and socket contacts.

The shield is connected with the connector housing in compliance with EMC guidelines. All plug connectors seal the plug on the cable end with a lamellar seal and ensure cable relief according to EN 61884.

Prefabricated cables for inverter end

The individual cable cores of the power cables are exposed and the shield is prepared for connection in the control cabinet. The cable for the inverter end has yet to be assembled. The loose parts required are supplied with the cable in a separate bag.

Loose parts

The following loose parts are supplied in accordance with the core cross sections for connection to the power terminals on the inverter:

Bag no.	Contents
1	4 x conductor end sleeves 1.5 mm^2, insulated 4 x M6 U-shaped cable lugs 1.5 mm^2
2	4 x conductor end sleeves 2.5 mm^2 , insulated 4 x M6 U-shaped cable lugs 2.5 mm^2
3	4 x conductor end sleeves 4 mm^2 , insulated 4 x M6 U-shaped cable lugs 4 mm^2 4 x M10 U-shaped cable lugs 4 mm^2

Structure of power cables for SL2-100 and SL2-150 motors

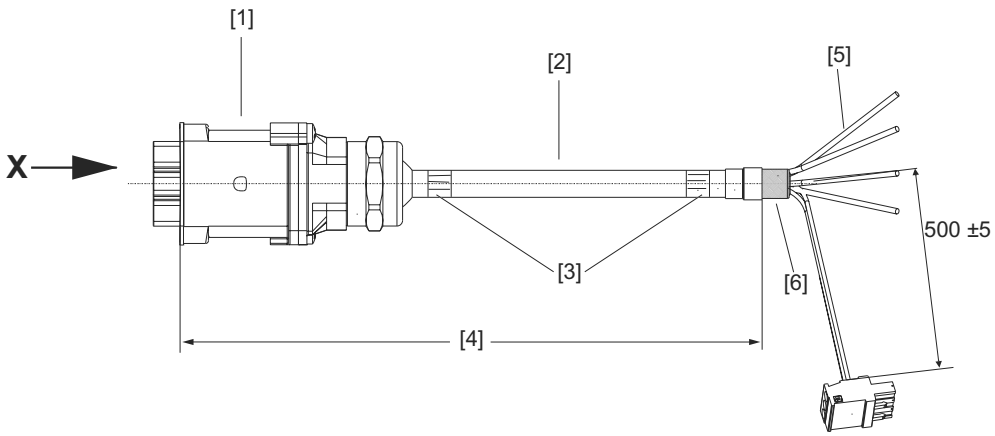


Figure 29: Power cables for SL2-100 and SL2-150 motors

[1] Connector: Amphenol
[2] SEW-EURODRIVE logo printed on cable
[3] Nameplate
[4] Line length ≤ 10 m: +200 mm tolerance
Line length ≥ 10 m: +2 % tolerance
Permitted line length according to the technical documents
[5] Prefabricated cable end for inverter
Required loose parts are supplied with the cable
[6] Shielding pulled back approx. 20 mm + 5 mm

Prefabricated cables for motor end

The power cables on the motor end have a 6-pin EMC Amphenol plug connector and socket contacts.

The shield is connected with the connector housing in compliance with EMC guidelines. All plug connectors seal the plug on the cable end with a lamellar seal and ensure cable relief according to EN 61884.

Prefabricated cables for inverter end

The individual cable cores of the power cables are exposed and the shield is prepared for connection in the control cabinet. The cable for the inverter end has yet to be assembled. The loose parts required are supplied with the cable in a separate bag.

Loose parts

The following loose parts are supplied in accordance with the core cross sections for connection to the power terminals on the inverter:

Bag no.	Contents
1	4 x conductor end sleeves 1.5 mm^2, insulated 4 x M6 U-shaped cable lugs 1.5 mm^2
2	4 x conductor end sleeves 2.5 mm^2 , insulated 4 x M6 U-shaped cable lugs 2.5 mm^2
3	4 x conductor end sleeves 4 mm^2 , insulated 4 x M6 U-shaped cable lugs 4 mm^2 4 x M10 U-shaped cable lugs 4 mm^2
4	4 x M6 U-shaped cable lugs 6 mm^2 4 x M10 U-shaped cable lugs 6 mm^2
5	4 x M6 U-shaped cable lugs 10 mm^2 4 x M10 ring-type cable lugs 10 mm^2

Structure of the AL1H feedback cable for MOVIDRIVE® compact / MOVIDRIVE B

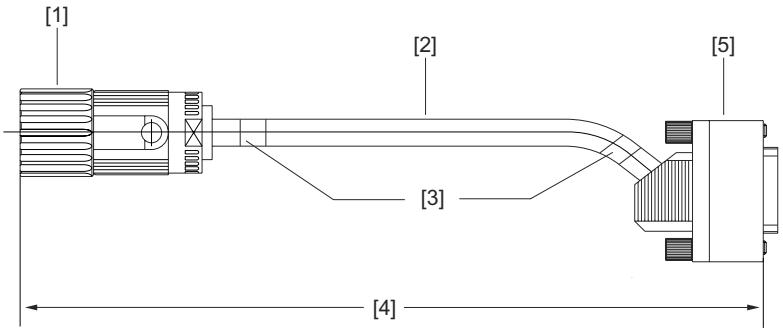


Figure 30: Measuring system plug connector

[1] Connector: Intercontec ASTA
[2] Printed on connector: SEW-EURODRIVE
[3] Nameplate
[4] Line length ≤ 10 m: +200 mm tolerance
Line length ≥ 10 m: +2 % tolerance
Permitted line length according to the technical documents
[5] Sub D plug

A 12-pin EMC signal plug connector with socket contacts from Intercontec is used to connect the encoder system. The shield is connected in the connector housing according to EMC aspects. All plug connectors seal the plug on the cable end with a lamellar seal.

Prefabricated cables for inverter end

A commercially available sub-D EMC connector with pin contacts is used on the inverter end. A 9-pin or 15-pin connector matching the inverter is used.

Hybrid cables

The outer cable sheath on the motor and inverter end bears a nameplate with part number and logo of the pre-fabricated cable manufacturer. Interrelation of permitted tolerance and ordered length:

- Line length ≤ 10 m: 200 mm tolerance
- Line length ≥ 10 m: +2 % tolerance

Refer to the system manual of the inverter for determining the maximum cable length.

Make sure that an EMC-compliant environment is maintained during project planning.

Pin assignment for SL2-050 power cables

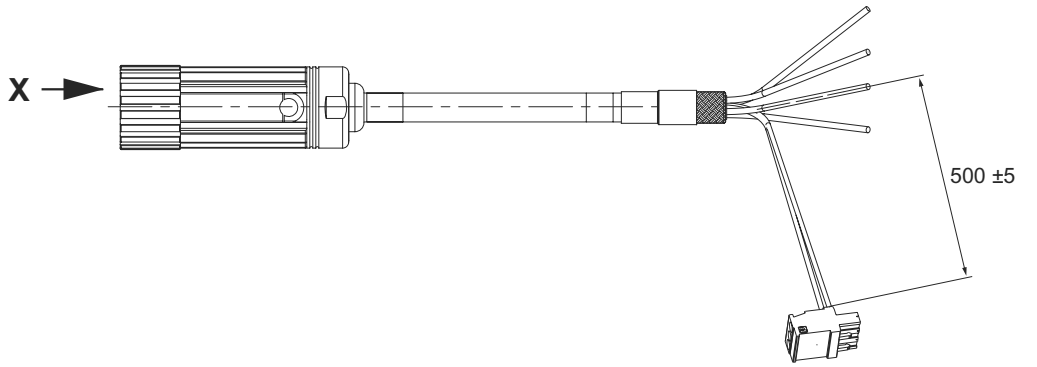
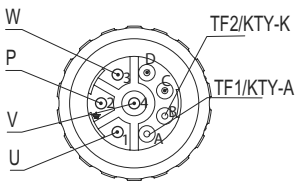


Figure 31: Power cables for SL2-050

The customer assembles the cable with a Phoenix plug connector. The connector can be cut off because it is not required for the TF connection.

Plug connector	Contact	Core identification	Assigned	Contact type	Extra
BSTA 078  **View X**	1	Black with white lettering U, V, W	U		Bag of loose parts
	4		V		
	3		W		
	2	Green/yellow	PE		
	A	Black with white lettering 1, 2, 3	TF1/KTY-A	Cut off Phoenix connector	
	B		TF2/KTY-K		
	C	–	n.c.	Ground at control cabinet end	
	D	–	n.c.		

Plug connector type	Number of cores and line cross section	Part number	Installation type
SB 71/81	**4 x 1.5 mm² (AWG 16)** **3 x 1 mm² (AWG 17)**	0590 4811	Cable carrier installation
SB 72/82	**4 x 2.5 mm² (AWG 14)** **3 x 1 mm² (AWG 12)**	0590 4838	Cable carrier installation
SB 74/84	**4 x 4 mm² (AWG 12)** **3 x 1 mm² (AWG 17)**	0590 4846	Cable carrier installation

Power extension cable SL2-050

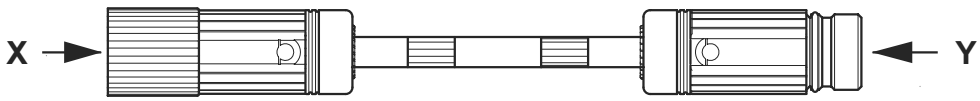


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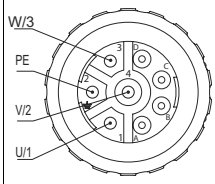
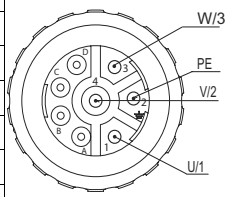
Figure 32: Power extension cable SL2-050

Pin assignment for power extension cables

Plug connector	Contact	Core identification	As-signed	Contact	Plug connector
BSTA 078  **View X**	1	Black with white lettering U, V, W	U	1	**BKUA 199**  **View Y**
	4		V	4	
	3		W	3	
	2	Green/yellow	PE	2	
	A	Black with white lettering 1, 2, 3	TF1	A	
	B		TF2	B	
	C		n.c.	C	
	D		n.c.	D	

Plug connector type	Number of cores and line cross section	Part number	Installation type
SB11	**4 ×1.5 mm² (AWG 16) + 2 × 0.75 mm² (AWG 18)**	0593 650 0	Cable carrier installation

Pin assignment for SL-100 and SL2-150 power cables

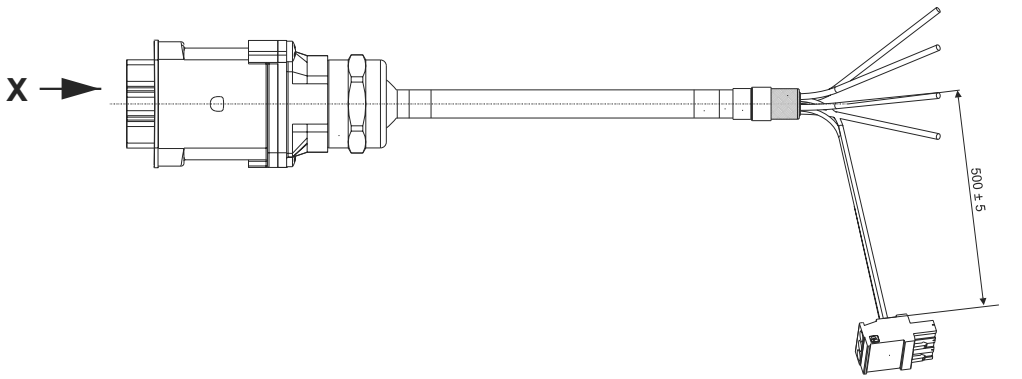


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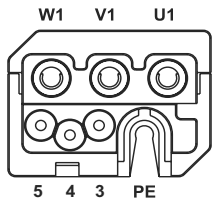
Figure 33: Power cables for SL2-100 and SL2-150

The cable is fitted with a Phoenix plug connector at the control cabinet end. The connector can be cut off because it is not required for the TF connection.

Plug connector	Contact	Core identification	Assigned	Contact type	Extra
C148U connector with socket contacts	U1	Black with white lettering U, V, W	U	Cut-off, length ca. 250 mm	Bag of loose parts
	V1		V		
	W1		W		
 **View X**	PE	Green/yellow	(protective earth)		
	3	Black with white lettering 1, 2, 3	n.c.	Ground at control cabinet end	
	4		TF1/KTY-A	Cut-off Phoenix connector	
	5		TF2/KTY-K		

Power cable types

Plug connector type, complete	Number of cores and line cross section	Part number	Installation type
SB 51 / SB 61	**4 x 1.5 mm² (AWG 16) + 3 x 1.0 mm² (AWG 17)**	199 190 6	Cable carrier installation
SB 52 / SB 62	**4 x 2.5 mm² (AWG 12) + 3 x 1.0 mm² (AWG 17)**	199 192 2	
SB 54 / SB 64	**4 x 4 mm² (AWG 10) + 3 x 1.0 mm² (AWG 17)**	199 194 9	
SB 56 / SB 66	**4 x 6 mm² (AWG 10) + 3 x 1.5 mm² (AWG 16)**	199 196 5	
SB 59 / SB 69	**4 x 10 mm² (AWG 10) + 3 x 1.5 mm² (AWG 17)**	199 198 1	

Pin assignment for power extension cables SL2-100 and SL2-150

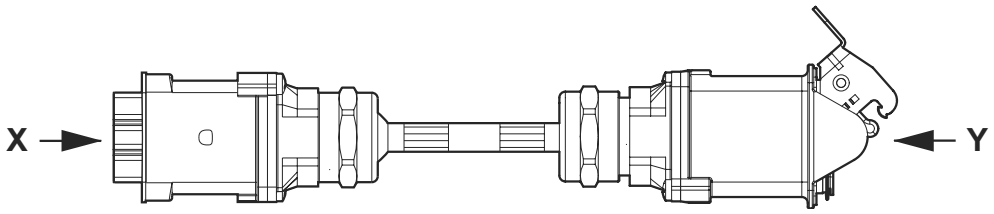


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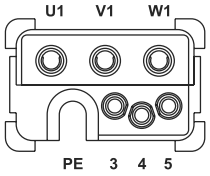
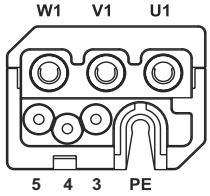
Figure 34: Power extension cables for SL2-100 and SL2-150

Pin assignment for extension cables

Plug connector	Contact	Core identification	Contact	Plug connector
C148U adapter with pin contacts	U1	Black with white lettering U, V, W	U1	**C148U connector with socket contacts**
	V1		V1	
	W1		W1	
 View Y	PE	Green/yellow	PE	 **View X**
	n.c.	Black with white lettering 1, 2, 3	n.c.	
	4 (TF1)		4 (TF1)	
	5 (TF2)		5 (TF2)	

The extension cable has the same pin assignment as all other contacts.

Types of power extension cables

Plug connector type, complete	Number of cores and line cross section	Part number	Installation type
SK 51 / SK 61	**4 x 1.5 mm² (AWG 16) + 3 x 1.0 mm² (AWG 17)**	199 200 7	Cable carrier installation
SK 52 / SK 62	**4 x 2.5 mm² (AWG 12) + 3 x 1.0 mm² (AWG 17)**	199 202 3	
SK 54 / SK 64	**4 x 4 mm² (AWG 10) + 3 x 1.0 mm² (AWG 17)**	199,204 X	
SK 56 / SK 66	**4 x 6 mm² (AWG 10) + 3 x 1.5 mm² (AWG 16)**	199 206 6	
SK 59 / SK 69	**4 x 10 mm² (AWG 10) + 3 x 1.5 mm² (AWG 17)**	199 208 2	

Alternative plug connector at customer end

Plug connectors for power supply with socket contacts (complete).

Type	Cross sections	Part no.
SB51 / SB61	**4 x 1.5 mm² (AWG 16) + 3x1.0 mm² (AWG 17)**	199 142 6
SB52 / SB62	**4 x 2.5 mm² (AWG 12) + 3x1.0 mm² (AWG 17)**	199 143 4
SB54 / SB64	**4 x 4 mm² (AWG 10) + 3x1.0 mm² (AWG 17)**	199 144 2
SB56 / SB66	**4 x 6 mm² (AWG 10) + 3x1.5 mm² (AWG 16)**	199 145 0
SB59 / SB69	**4 x 10 mm² (AWG 10) + 3x1.5 mm² (AWG 17)**	199 146 9

Cable for AL1H encoders

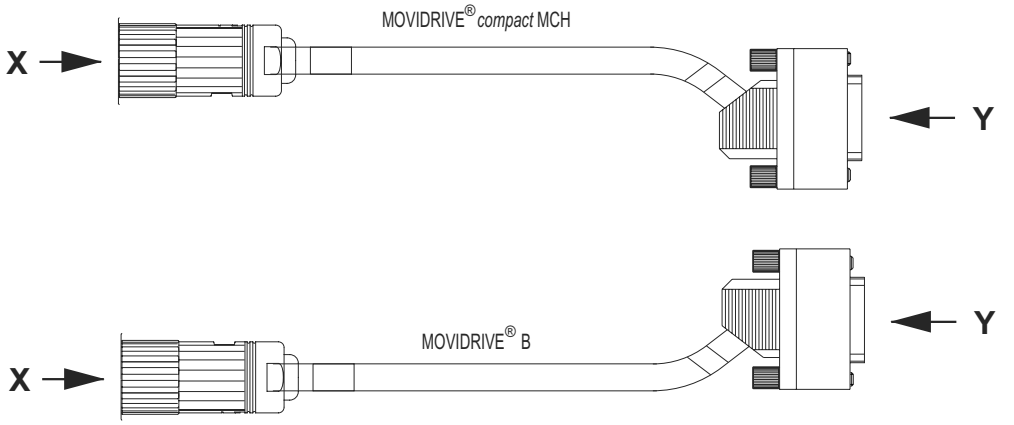
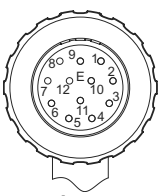
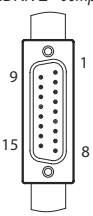


Figure 35: Feedback cable for AL1H encoders

Type	Installation	Part number
SL2	Cable carrier installation (MOVIDRIVE® *compact* MCH)	1332 8328
SL2	Cable carrier installation (MOVIDRIVE® B)	0595 1518

Cable pin assignment for feedback cables

Encoder end					Connection MOVIDRIVE® *compact* MCH MOVIDRIVE® MDX..B	
Plug connector	**Contact no.**	**Description**	**Cable core color**	**Description**	**Contact no.**	**Plug connector**
ASTA021FR **198 921 9** 12-pin with socket contacts  **View X**	1	S3 (cosine -)	Blue (BU)	S3 (cosine -)	9	Sub-D 15-pin MOVIDRIVE® *compact* MCH  MOVIDRIVE® B **View Y**
	2	Data (+)	Black (BK)	Data (+)	4	
	3	Unassigned		Unassigned	3	
	4	Unassigned		Unassigned	5	
	5	S2 (sine +)	Yellow (YE)	S2 (sine +)	2	
	6	S4 (sine -)	Green (GN)	S4 (sine -)	10	
	7	Data (-)	Violet (VT)	Data (-)	12	
	8	S1 (cosine +)	Red (RD)	S1 (cosine +)	1	
	9	Unassigned		Unassigned	6	
	10	GND	Gray/pink (GY/PK) / pink (PK)	GND	8	
	11	Unassigned		Unassigned	7	
	12	U_S	Gray (GY)	U_S	15	
		Unassigned	Unassigned	Unassigned	11	
		Unassigned	Unassigned	Unassigned	13	
		Unassigned	Unassigned	Unassigned	14	

Extension cable for AL1H encoders

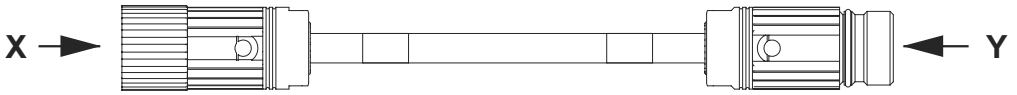


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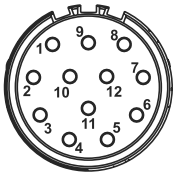
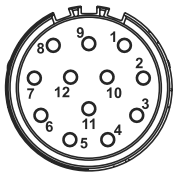
Figure 36: Extension cable for AL1H encoders

The extension cable for AL1H encoders corresponds to the cable types DFS/CFM

Type	Installation	Part number
DFS/CFM	Cable carrier installation	199 540 5

Pin assignment of extension cable for feedback

Pin assignment of extension cable for AL1H encoders						
Plug connector	**Contact no.**	**Description**	**Cable core color**	**Description**	**Contact no.**	**Plug connector**
ASTA021FR 198 673 2 12-pin with socket contacts  **View X**	1	The extension cable has the same pin assignment as all other contacts.			1	AKUA020MR **199 647 9** 12-pin with pin contacts  **View Y**
	2				2	
	3				3	
	4				4	
	5				5	
	6				6	
	7				7	
	8				8	
	9				9	
	10				10	
	11				11	
	12				12	

Cable carrier installation of power cables

Technical specifications of the cable

Installation type		**Cable carrier**				
Cable cross sections		**4 x 1.5 mm² + 3 x 1 mm²**	**4 x 2.5 mm² + 3 x 1 mm²**	**4 x 4 mm² + 3 x 1 mm²**	**4 x 6 mm + 3 x 1.5 mm²**	**4 x 10 mm² + 3 x 1.5 mm²**
Manufacturer		**Nexans**				
Manufacturer designation		PSL11YC11Y-J 4x... +3A.../C				
Operating voltage Vo/	[VAC]	600 / 1000				
Temperature range	[°C]	-20 to +60				
Max. temperature	[°C]	+ 90 (conductor)				
Min. bending radius	[mm]	150	170	155	175	200
Diameter D	[mm]	13.6 - 16.5	15.5 - 17.0	15.3 ± 0.5	17.4 ± 0,5	20.5 ± 0.5
Max. acceleration	[m/s²]	20				
Max. velocity	[m/min]	200 at max. travel distance of 5 m				
Core identification		BK with lettering WH + GN/YE				
Sheath color		Orange similar to RAL 2003				
Approval(s)		DESINA / VDE / UL / c UL us				
Capacitance core/shielding	[nF/km]	< 95	< 95	170	170	170
Capacitance core/core	[nF/km]	< 65	< 65	95	95	95
Halogen free		Yes				
Silicone-free		Yes				
CFC-free		Yes				
Inner insulation (cable)		TPM				
Outer insulation (sheath)		TPU (PUR)				
Flame-inhibiting/self-extinguishing		Yes				
Conductor material		E-Cu blank				
Shielding		Braided tinned Cu shield (optically covered > 85 %)				
Weight (cable)	[kg/km]	280	380	410	540	750

Cable carrier installation of feedback cable

Technical specifications of the cable

Installation type		**Cable carrier**
Accessory designation		**AL1H / ES1H**
Cable cross sections		**6 x 2 x 0.25 mm^2**
Manufacturer		**Nexans**
Manufacturer designation		SSL11YC11Y6x 2 x 0.25
Operating voltage Vo/	[VAC]	300
Temperature range	[°C]	-20 to +60
Max. temperature	[°C]	+90 (on the conductor)
Min. bending radius	[mm]	100
Diameter D	[mm]	9.8 ± 0.2
Max. acceleration	[m/s^2]	20
Max. velocity	[m/min]	200
Core identification		WH/BN, GN/YE, GY/PK, BU/RD, BK/VT, GY-PK/RD-BU
Sheath color		Green similar to RAL 6018
Approval(s)		DESINA / VDE / c UL us
Capacitance core/shielding	[nF/km]	100
Capacitance core/core	[nF/km]	55
Halogen free		Yes
Silicone-free		Yes
CFC-free		Yes
Inner insulation (core)		PP
Outer insulation (sheath)		TPE-U
Flame-inhibiting/self-extinguishing		Yes
Conductor material		E-Cu blank
Shielding		Braided tinned Cu
Weight	[kg/km]	130

Power supply for the fan

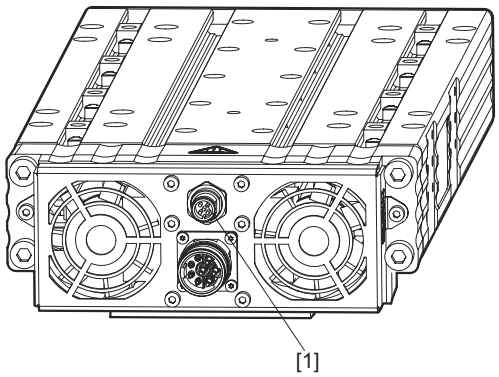


Figure 37: Power supply for the fan

[1] M12 fan connection, 5-pole

The fans in power design are supplied via a commercially available 5-pole, M12 plug connection with 24 V DC.

Customer connection cables are not available from SEW-EURODRIVE.

Suitable connection cables can be ordered from manufacturers, such as:

- Phoenix CONTACT
- Hirschmann
- Harting

.

The following table is an extract from trailing cables available from Phoenix CONTACT:

Sensor/actuator cables, straight M12 socket, 3-pin (suitable for 5-pin connector)

Cable length	Article designation	Article number
3 m	SAC-3P-3,0-PUR/M12FS	16 94 49 9
5 m	SAC-3P-5.0-PUR/M12FS	16 83 51 0
10 m	SAC-3P-10.0-PUR/M12FS	16 93 03 4

7 Startup

7.1 Prerequisites for startup

It is essential to comply with the safety notes in Sec. 2 during startup!

Before startup, make sure that:

- The primary moves along the entire travel distance with easy movement, without collisions and free from mechanical contact between primary and secondary,
- All connections have been made properly.
- All protection devices have been installed correctly,
- All motor protection devices are active.
- The brake works correctly in hoists
- You have a MOVIDRIVE® with firmware that supports SL2 linear motors.
  (e.g. MOVIDRIVE® MCH xxx -08; MDV xxx -08 or MOVIDRIVE® B MDX...-08)
- There are no other sources of danger present.
- The startup software MOVITOOLS® is installed on your PC.

7.2 Sequence of the commutation travel

Contrary to rotating systems, there is no mechanical connection between encoder system, primary and secondary in SL2 linear motors.

This connection must be established during startup. The SL2 synchronous linear motor can be controlled directly by the servo controller after initial setup.

This process is referred to as commutation search or commutation travel.

This takes place

- Once after "encoder adjustment" for absolute distance measuring systems
- Every time the unit is turned on or reset in case of incremental distance measuring systems.

Sequence of the commutation travel

1. The SL2 linear motor is moved to a random position in positive or negative direction (0 mm up to 16 mm away from the current position). Here the SL2 linear motor will stop for about one second.

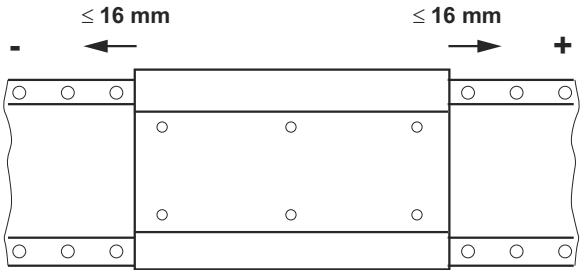


Figure 38: Commutation travel 1st cycle

2. The SL2 linear motor is moved by 32 mm in the positive direction. Here it will stop for about one second.

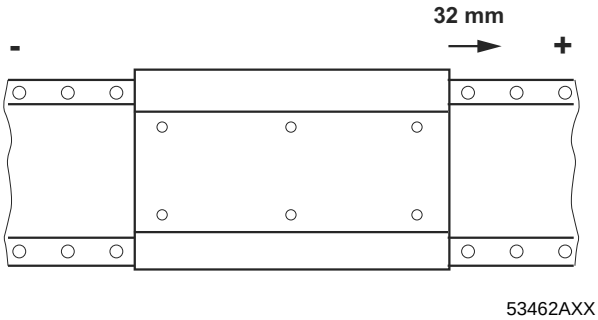


Figure 39: Commutation travel 2nd cycle

3. The SL2 linear motor is moved by 32 mm in the negative direction. Here it will stop for about one second.

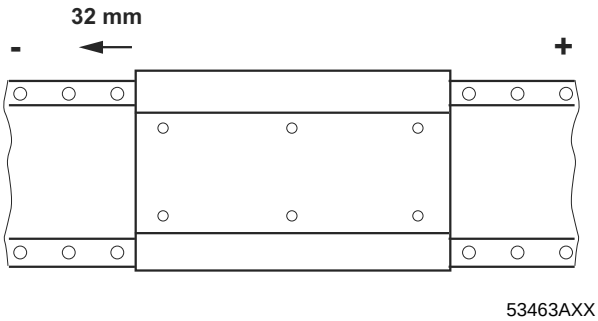


Figure 40: Commutation travel 3rd cycle

The SL2 linear motor will repeat the commutation travel if it reaches a hardware limit switch during commutation travel. That causes the SL2 linear motor to approach a new start position that is moved in by 32 mm and repeat the commutation travel.

You will then hear a little cracking noise and the SL2 linear motor switches from controlled to automatic operation.

7.3 Startup procedure

Proceed as follows to do this:

Parameter setting

1. Make sure that the servo controller is in controller inhibit or 24V operation mode.
2. Execute startup for linear motor in MOVITOOLS® Shell starting with factory setting.

   Refer to the online help for linear motor startup. Parameter setting is complete once you have pressed the "Download" button twice and the window in Figure 41 is displayed again. Exit the startup window at this point.

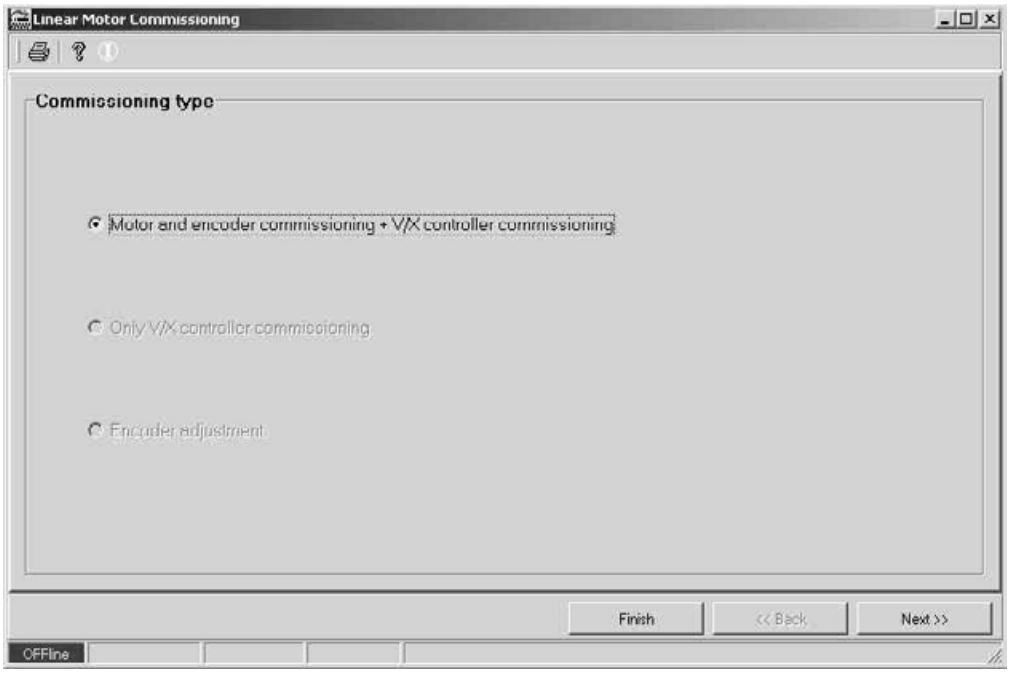


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Figure 41: Main dialog for startup of SL2 linear motors in menu "Startup → SL2 Synchronous linear motors"

Checking encoder evaluation

3. Manually slide the parameter in one direction and observe parameter P003 (actual position) in MOVITOOLS® Shell. Determine the positive direction of movement. Then slide the SL2 linear motor once over the entire travel distance to check if the encoder works correctly in all areas.

Check hardware limit switches

4. Set the parameters for the hardware limit switches such as inFigure 42 and check their function by manually sliding the primary to the limit switches.

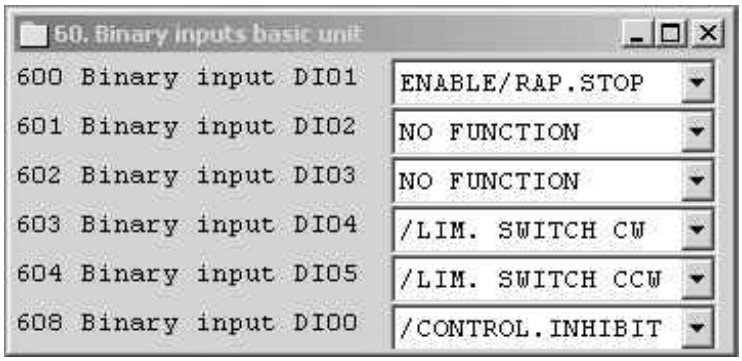

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Figure 42: Binary inputs basic unit

Activate drive limits for initial startup

5. For initial startup limit the maximum speed via parameter P302 (max. speed 1) and the maximum force with parameter P304 (torque limit) so that the motor cannot develop its full force and speed in case of an uncontrolled axle movement.

Do **not** limit the maximum force with parameter P303 (current limit 1) and do **not** limit the maximum speed in the first dialog of the linear motor startup (this is the dialog that appears after Figure 41) because these parameters also affect internal system values.

Commutation travel

6. Deactivate the controller inhibit DI00=1. The SL2 linear motor will now start the commutation sequence described above. See section 7 for troubleshooting of errors that may occur during commutation travel.

Under no circumstances may enable be present during commutation travel!

The variable H458=1 will be automatically set by the servo controller after successful commutation travel. This value will later evaluated by the IPOS$^{plus®}$ program or in the PLC later to permit servo controller enable.

Optimize axle

7. Write a short program to have the SL2 linear motor move cyclically between two positions.

   Start the program and in the linear motor startup (see Figure 41) carry out the point "V/X controller startup only." If the SL2 linear motor moves correctly, set the current and force limits to their original values (see point 5) and optimize the drive control loop via *"Stiffness*" and the button "*Estimate*" (see Figure 43) as you would with rotary servomotors.

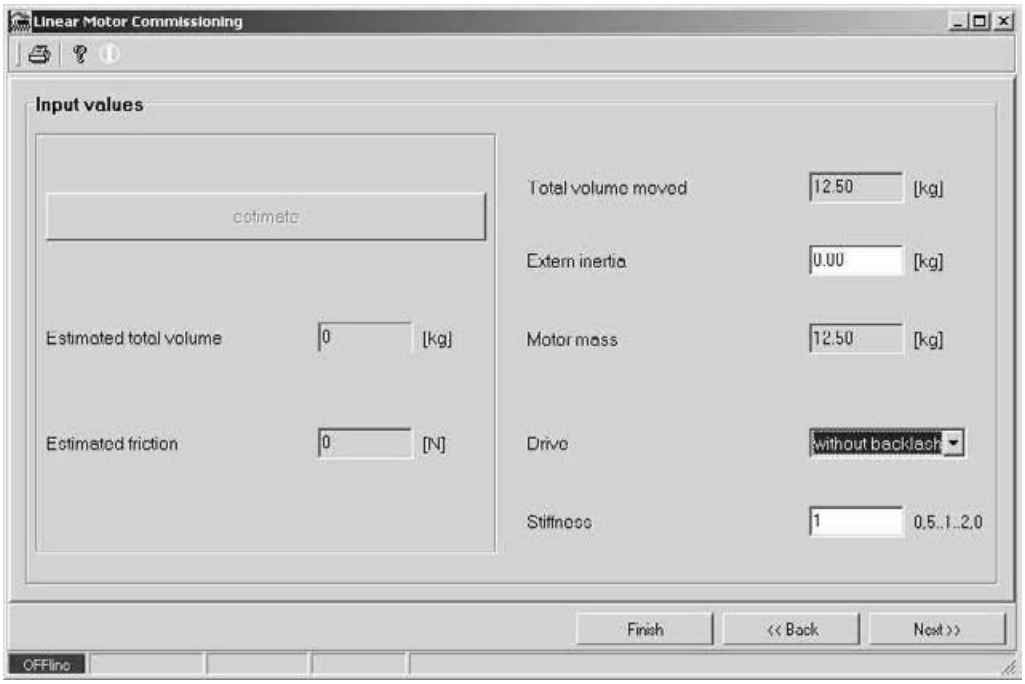

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Figure 43: Dialog for optimum setting of axle with button "Estimate" and input field "Stiffness"

Additional settings

8. With an absolute encoder, you will now execute the menu item "Encoder adjustment". The SL2 linear motor is then ready for operation immediately once the system is turned on. If you do not carry out the menu item "Encoder adjustment", an absolute encoder will behave like an incremental encoder and the SL2 linear motor will carry out a commutation travel once the controller inhibit has been emoved and the unit turned on.

9. If you need a different positive encoder counting direction for your linear axis, activate the reversal option for the motor rotation via parameter P350.

10. Remove the TF line from the servo controller with the motor at standstill or enabled to check if the TF monitoring is responding (Error 31; TF trigger).

11. If the drive has an external brake, we recommend addressing it directly. Brake control takes place via parameters P730 - P732.

7.4 Calculation of travel parameters

The servo controller and the integrated IPOS$^{plus®}$ sequence control work internally with rotary values. During startup, the program determines conversion factors for linear values to rotary values.

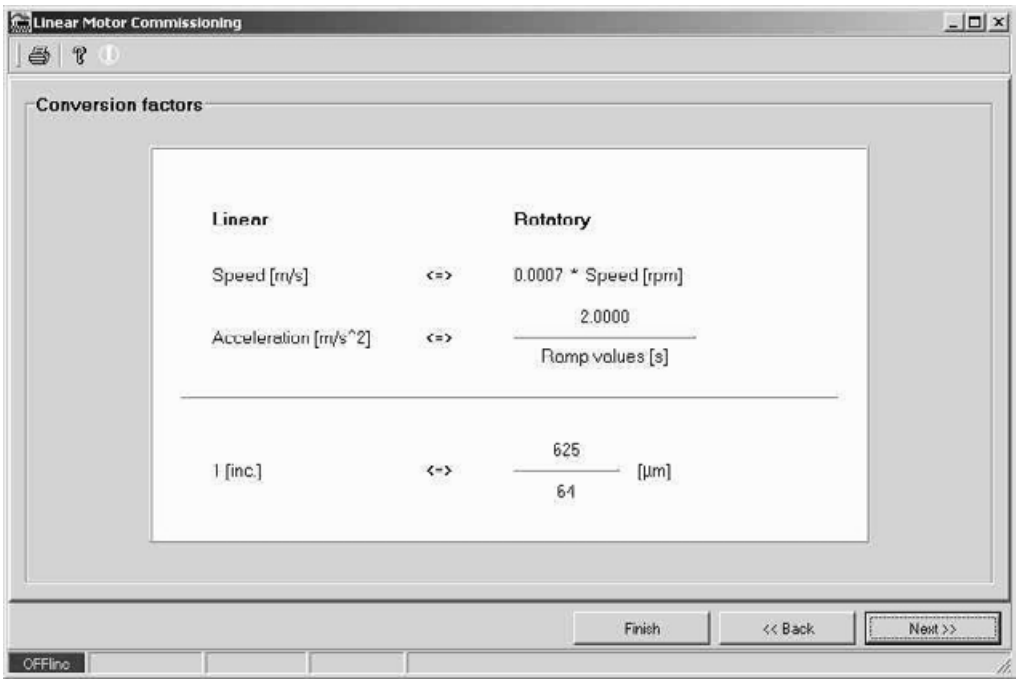

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Figure 44: Conversion factors for SL2-100M-030 with HIPERFACE® encoder displayed at the end of linear motor startup

Example:

An SL2-100M-030 synchronous linear motor with HIPERFACE® encoder is to be operated with the following travel information:

v = 1m/s

s = 1000 mm

a = 5 m/s^2

Based on the conversion factors shown above, the following rotary information will show up in IPOS$^{plus®}$ or via fieldbus:

Speed = 0.0007 / velocity = 1428 1/min

Distance = 64 / 625 × 1000 = 102400 increments

Ramp = 2.000 / 5 = 0.4 sec.

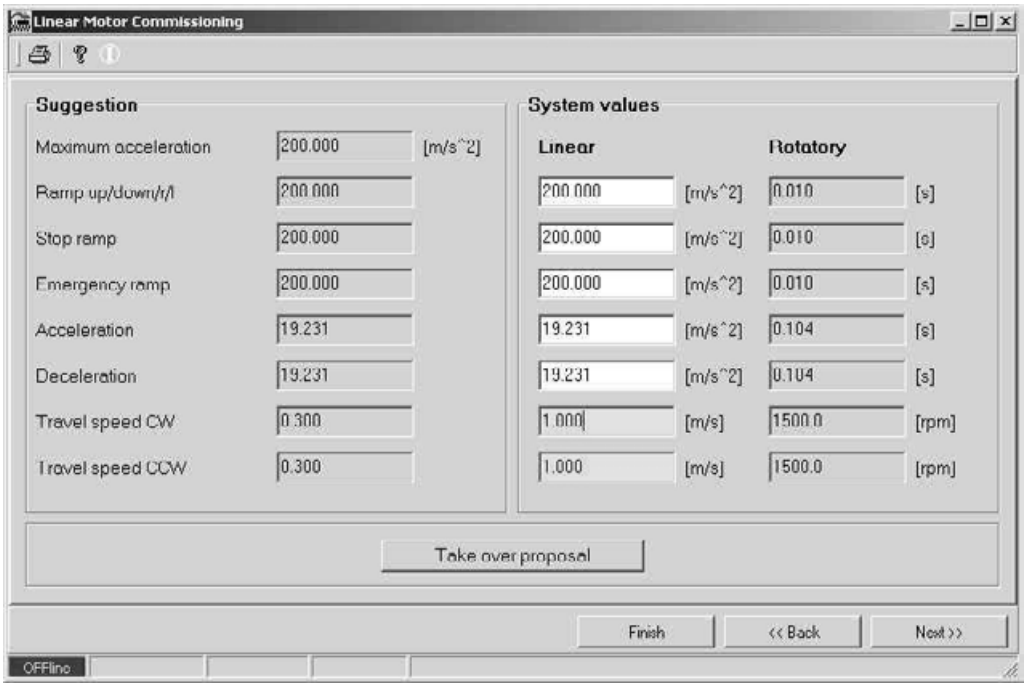

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Figure 45: Dialog in linear motor startup with internal conversion of linear values to rotary values

The values in Figure 44 are rounded off. You can calculate the exact rotary values for IPOS$^{plus®}$ from the linear values with the last dialog of the V/X controller startup. InFigure 45 a set speed of 1500 1/min was calculated for IPOS$^{plus®}$ after input of the positioning velocity 1m/s.

8 Malfunctions

The servo controller reports malfunctions depending on type via diagnostic LEDs or a 7-segment display and an error code. Consult the system manual or the operating instructions for the respective MOVIDRIVE® for troubleshooting. The following notes offer additional information for troubleshooting especially for SL2 synchronous linear motors.

Problems may occur that are hard to localize if the EMC wiring is not carried out correctly. These are often coupled into the servo controller by the TF lines running in the same duct as the motor cable. We recommend disconnecting the TF for test purposes (set P835 to no response) during commutation travel to exclude this error.

Motor monitoring is off. Make sure that there is no thermal overload at the SL2 linear motor! Otherwise the SL2 linear motor will be destroyed. Make sure to connect the TF monitoring after successful troubleshooting and set parameter P835 to EMERGENCY STOP / FAULT.

8.1 Problems during commutation search

Problem	Possible cause	Remedy
Encoder error (14) when SL2 linear motor is moved manually	Resolver not mounted correctly	Check mounting with the help of encoder manufacturer information: 1. Air gap encoder - measuring tape 2. Alignment encoder - measuring tape 3. with HIPERFACE® encoder: Check mounting direction so that cable output shows in direction smaller absolute values (direction "dot" on the measuring tape if present)
	Encoder not connected correctly	Check pin assignment, operate HIPERFACE® encoder as sin/cos encoder for test purposes
SL2 linear motor does not start after removal of CONTROLLER INHIBIT	Motor cable interrupted	Check linear motor connection
	Brake function P730 = ON	P730 must be set to OFF for commutation search
	(only for HIPERFACE® encoder) servo controller reports that encoder has already been adjusted (H458=1)	If you want to carry out a commutation travel, enter "Encoder adjustment" in the startup dialog; the servo controller will reset the bit automatically in this case
n-monitoring/ setpoint deviation during commutation travel	Servo controller not in status "NO ENABLE" because enable is set in addition to CONTROLLER INHIBIT or a terminal has been programmed to "ENABLE"	Assign binary input directly on unit via IPOS$^{plus®}$ control word or via fieldbus with ENABLE, e.g. P603 = ENABLE/ STOP
	EMC problems	See system manual and volume 9 Practical Drive Engineering. Check for correct shielding, equipotential bonding and observe the note at the beginning of this section
Encoder error after commutation travel in positive directin (2nd movement)	Counting direction of the encoder does not correspond to U,V,W phase sequence of motor	Check to see if encoder counts positive in the direction that the primary was moving. If not, swap connections of U and W motor cables.
	Resolution of encoder system incorrect/Encoder defective	Slide the SL2 linear motor for a defined distance and check with the calculation by MOVITOOLS® if the displayed increments correspond to the calculated value. Adjust the encoder resolution in the linear motor startup, if necessary, and check the distance between scanner and measuring tape.
	Current limit reduced too much	Reset P303 to the value set by linear motor startup. Use parameter P304 for force reduction
Encoder error after commutation travel in negative directin (3rd movement)	Travel distances are not identical because axle is mechanically sluggish	Make sure that the drive travels with easy movement for the entire distance and no other forces are at play (process forces, weight forces)
	Travel distances are not identical because encoder is defective	Slide the SL2 linear motor for a defined distance and check with the calculation by MOVITOOLS® if the displayed increments correspond to the calculated value. Adjust the encoder resolution in the linear motor startup, if necessary, and check the distance between scanner and measuring tape.
	Current limit reduced too much	Reset P303 to the value set by linear motor startup. Use parameter P304 for force reduction
SL2 linear motor overspeed	EMC problems	See system manual and volume 9 Practical Drive Engineering. Check for correct shielding, equipotential bonding and observe the note at the beginning of this section
	Defective spot in linear scale	Slide the SL2 linear motor for a defined distance and check with the calculation by MOVITOOLS® if the displayed increments correspond to the calculated value. Perform checks at several spots and check the distance between scanner and measuring tape.

8.2 Problems during operation

Problem	Possible cause	Remedy
SL2 linear motor does not start	Motor cable interrupted	Check motor connection
	Brake is not released	Check brake control; check air supply for pneumatic brakes
SL2 linear motor makes humming noise or does not run smoothly	Fault on encoder cable	See system manual and volume 9 Practical Drive Engineering. Check for correct shielding, equipotential bonding and observe the note at the beginning of this section
	Controller parameters set incorrectly	Perform startup of control loop once again
	Encoder connection with primary not rigid enough	Check to see if mechanical connection between encoder and primary is rigid enough.
	Permitted operating temperature of encoder exceeded	• Select travel cycle so that effective value of output current is less than rated current of motor • Arrange for better heat dissipation of primary • Decouple encoder thermally (mounting with plastic distance plate) • Use encoder system with higher permitted operating temperature
SL2 linear motor heats up excessively	Overload	Select travel cycle so that effective value of output current is less than rated current of motor
	Inadequate cooling	Improve cooling or install fan
	Air gap too large, resulting in power loss at same current (see derating table in catalog)	Adjust air gap
	Ambient temperature is too high	Select travel cycle so that effective value of output current is less than rated current of SL2 linear motor
HIPERFACE® encoder fault	Problems on encoder cable	If the problems do not occur during manual sliding, they are often caused by problems in the encoder or TF line. Consult the system manual or volume 9 of Practical Drive Engineering for troubleshooting. Check for correct shielding, equipotential bonding and observe the note at the beginning of this section
	Resolver not mounted correctly	Check mounting with the help of encoder manufacturer information: 1. Air gap encoder - measuring tape 2. Alignment encoder - measuring tape 3. with HIPERFACE® encoder: Check mounting direction so that cable output shows in direction smaller absolute values (direction "dot" on the measuring tape if present); check rigidity of encoder mounting. Observe the manufacturer tolerances even with fast accelerations.

9 Inspection / Maintenance

- Use only genuine spare parts in accordance with the valid parts list!
- Motors can become very hot during operation – danger of burns!
- Disconnect the SL2 linear motor from the power supply before starting work and protect it against unintentional re-start!
- Use caution at secondaries → see safety notes section 2

9.1 General maintenance work

The primaries and secondaries are maintenance-free and cannot be repaired. Replace defective parts.

Remove any traces of dirt, chips, dust, etc. from the secondaries with a soft cloth.

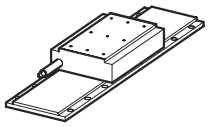
Note that mobile cables are subject to wear. They have to be checked for external changes on a regular basis.

9.2 Additional maintenance for Power version

Keep air entry screen on fans free from congestion.

10 Technical Data

10.1 SL2-Basic motor data



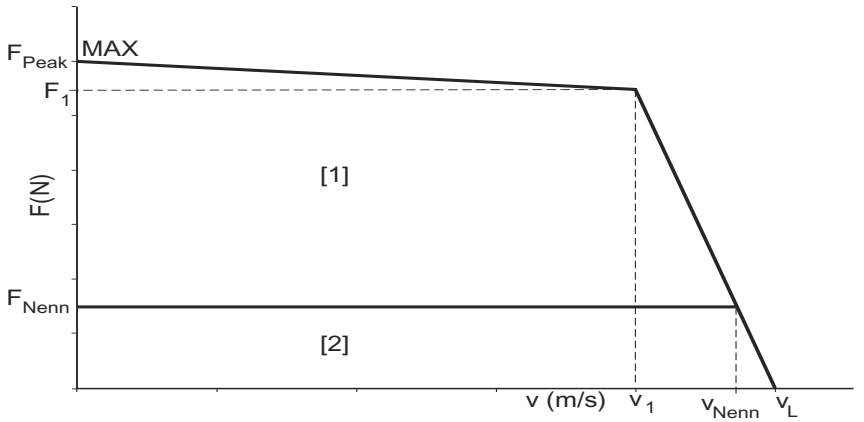


Figure 46: Characteristic curve

[1] = Dynamic limit forces
[2] = Thermal limit forces
F_{Nenn} = Permanent force
when mounting to a horizontal aluminum cooling surface with
- **four times primary flange surface**
- **10 mm thickness**
- **up to an ambient temperature of 40°C**
- **an installation altitude of up to 1000 m**

F_1 = Maximum force available up to v_1
F_{Peak} = Maximum force
v_L = Theoretical maximum traveling velocity
v_1 = Velocity up to which force F_1 is available
v_{Nenn} = Velocity up to which the rated force is available
I_{Nenn} = Rated current
I_1 = Current at F_1
I_{Peak} = Maximum current
F_D = Force through magnetic attraction

Motor type	Force				Velocity		Current			Cable cross section[1]	MOVIDRIVE® *compact* MCH4_A-xxxx-5A3-4-08[2] MOVIDRIVE® MDX61B MDX61B-xxxx-5-5x3-4-08 xxxx = Power at output stage in [kW]
	F_{Peak} [N]	F_1 [N]	F_{Nenn} [N]	F_D [N]	v_1 [m/s]	v_{Nenn} [m/s]	I_{Peak} [A]	I_1 [A]	I_{Nenn} [A]	[mm]	
SL2-050VS	650	500	280	1480	- 3 6	- 3.4 8.0	- 6.0 13.9	- 4.4 10.3	- 2.2 5.3	 3 x 1.5 3 x 1.5	- 0015 0030
SL2-050S	1300	1000	560	2880	1 3 6	1.3 3.4 6.9	4.8 11.8 24.5	3.5 8.7 17.8	1.8 4.5 9.0	3 x 1.5 3 x 1.5 3 x 1.5	0015 0022 0055
SL2-050M	1950	1500	840	4300	1 3 6	1.1 3.3 6.4	5.9 18.0 33.0	4.4 12.8 24.6	2.2 6.5 12.6	3 x 1.5 3 x 1.5 3 x 1.5	0015 0040 0075
SL2-050ML	2600	2000	1120	5700	1 3 6	1.1 3.4 6.9	7.8 24.0 48.0	5.8 17.8 35.5	2.9 9.1 18.2	3 x 1.5 3 x 1.5 3 x 2.5	0015 0055 0110

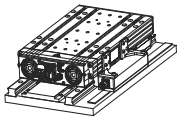
Motor type	Force				Velocity		Current			Cable cross section[1]	MOVIDRIVE® *compact* MCH4_A-xxxx-5A3-4-08[2] MOVIDRIVE® MDX61B MDX61B-xxxx-5-5x3-4-08
	F_{Peak} [N]	F_1 [N]	F_{Nenn} [N]	F_D [N]	v_1 [m/s]	v_{Nenn} [m/s]	I_{Peak} [A]	I_1 [A]	I_{Nenn} [A]	[mm]	xxxx = Power at output stage in [kW]
SL2-100VS	1325	1000	600	2950	1 3 6	1.1 3.8 6.9	4.8 14.2 24.6	3.4 10.3 17.8	1.9 5.6 9.7	3 x 1.5 3 x 1.5 3 x 1.5	0015 0030 0055
SL2-100S	2650	2000	1200	5760	1 3 6	1.1 3.4 6.9	8.0 25.0 49.0	5.8 17.8 35.5	3.1 9.7 20	3 x 1.5 3 x 1.5 3 x 2.5	0015 0055 0110
SL2-100M	3970	3000	1800	8570	1 3 6	1.3 3.2 6.9	14.2 35.0 75.0	10.3 24.6 53.3	5.6 13.5 29.2	3 x 1.5 3 x 1.5 3 x 4.0	0030 0075 0150
SL2-100ML	5300	4000	2400	11380	1 3 6	1.1 3.4 7.0	16.0 49.0 100.0	11.5 35.5 74.4	6.3 19.5 40.7	3 x 1.5 3 x 2.5 3 x 6.0	0040 0110 0220
SL2-150VS	2000	1500	900	4420	1 3 6	1.1 3.3 6.4	6.1 18.0 35.0	4.4 12.8 24.6	1.9 7.0 13.5	3 x 1.5 3 x 1.5 3 x 1.5	0015 0040 0075
SL2-150S	3900	3000	1800	8640	1 3 6	1.1 3.2 6.4	12.0 33.5 67.0	8.7 24.5 49.0	4.8 13.5 27.0	3 x 1.5 3 x 1.5 3 x 4.0	0022 0075 0150
SL2-150M	5800	4500	2700	12860	1 3 6	1.1 3.4 6.4	18.0 53.0 100.0	13.1 39.0 74.5	7.2 21.5 40.7	3 x 1.5 3 x 2.5 3 x 6.0	0040 0150 0300
SL2-150ML	7700	6000	3600	17000	1 3 6	1.1 3.7 6.4	24.0 76.0 132.0	17.4 56.7 98.0	9.4 31.0 53.8	3 x 1.5 3 x 4.0 3 x 6.0	0055 0220 0370
SL2-200VS	2700	2000	1260	5900	1 3 6	1.1 3.4 7.6	8.1 25.0 55.0	5.7 17.8 39.2	3.3 10.2 22.5	3 x 1.5 3 x 1.5 3 x 2.5	0055 0220 0370
SL2-200S	5200	4000	2520	11520	1 3 6	1.1 3.4 7.2	15.6 48.2 101	11.5 35.5 74.4	6.6 20.4 42.7	3 x 1.5 3 x 2.5 3 x 6.0	0055 0220 0370
SL2-200M	7800	6000	3780	17150	1 3	1.1 3.4	23.4 72.0	17.2 53.3	9.9 30.1	3 x 1.5 3 x 4.0	0055 0220
SL2-200ML	10350	8000	5040	22780	1 3	1.1 3.6	30.6 100.0	22.7 74.4	13.0 42.8	3 x 1.5 3 x 6.0	0055 0220
SL2-250VS	3170	2400	1500	7370	1 3 6	1.2 3.5 6.6	10.0 30.0 57.0	7.3 21.8 41.2	4.1 12.4 23.5	3 x 1.5 3 x 1.5 3 x 2.5	0055 0220 0370
SL2-250S	6300	4800	3000	14400	1 3 6	1.1 3.3 6.6	18.7 57.0 113.0	13.6 41.2 82.4	7.8 23.5 47.0	3 x 1.5 3 x 4.0 3 x 6.0	0055 0220 0370
SL2-250M	9450	7200	4500	21430	1 3	1.1 3.5	30.0 90.0	21.8 65.0	12.4 37.2	3 x 1.5 3 x 6.0	0055 0220
SL2-250ML	12600	9600	6000	28450	1 3	1.1 3.3	37.0 113.0	27.2 82.5	15.5 47.0	3 x 1.5 3 x 6.0	0055 0220

1) Cable cross section on SL2-Basic primary (for configuration of cable cross sections for the inverter, see section 6.1)

2) Required inverter power for F_{NENN}

Electrical values refer to sine-shaped commutation and are indicated as effective values or refer to them.

10.2 SL2-Advance System motor data



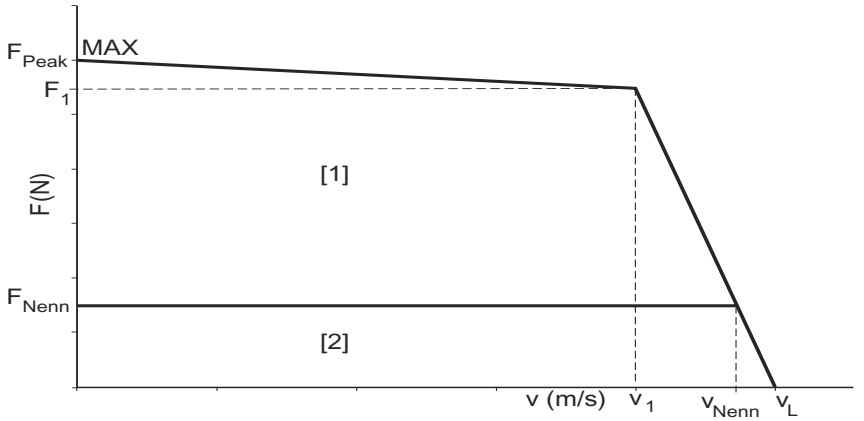


Figure 47: Characteristic curve

[1] = Dynamic limit forces
[2] = Thermal limit forces
F_{Nenn} = Permanent force

Rated characteristics refer to operation at
- **an ambient temperature of 40 °C**
- **an installation altitude of up to 1000 m**

F_1 = Maximum force available up to v_1
F_{Peak} = Maximum force
v_L = Theoretical maximum traveling velocity
v_1 = Velocity up to which force F_1 is available
v_{Nenn} = Velocity up to which the rated force is available
I_{Nenn} = Rated current
I_1 = Current at F_1
I_{Peak} = Maximum current
F_D = Force through magnetic attraction

Motor type	Force					Cable cross section	To cable lengths	Part part no.	Cable cross section	To cable lengths	Part part no.	MOVIDRIVE® *compact* MCH4_A-xxxx-5A3-4-08[1] MOVIDRIVE® MDX61BMDX61B-xxxx-5-5x3-4-08 xxxx = Power at output stage in [kW]
	F_1 [N]	F_{Nenn} [N]	v_1 [m/s]	I_{Peak} [A]	I_{Nenn} [A]	[mm²]	[m]		[mm²]	[m]		
SL2-050VS	500	280	- 3 6	- 6.0 13.9	- 2.2 5.3	1.5 1.5	100 100	0590 481 8 0590 481 8				- 0015 0030
SL2-050S	1000	560	1 3 6	4.8 11.8 24.5	1.8 4.5 9.0	1.5 1.5 1.5	100 100 57	0590 481 8 0590 481 8 0590 481 8	2.5	100	0590 483 8	0015 0022 0055
SL2-050M	1500	840	1 3 6	5.9 18.0 33.0	2.2 6.5 12.6	1.5 1.5 2.5	100 100 71	0590 481 8 0590 481 8 0590 483 8	4.0	100	0590 484 6	0015 0040 0075
SL2-050ML	2000	1120	1 3 6	7.8 24.0 48.0	2.9 9.1 18.2	1.5 1.5 4.0	100 57 100	0590 481 8 0590 481 8 0590 484 6	2.5	100	0590 483 8	0015 0055 0110
SL2-100VS	1000	600	1 3 6	4.8 14.2 24.6	1.9 5.6 9.7	1.5 1.5 1.5	100 100 57	0199 190 6 0199 190 6 0199 190 6	2.5	100	0199 192 2	0015 0030 0055
SL2-100S	2000	1200	1 3 6	8.0 25.0 49.0	3.1 9.7 20	1.5 1.5 4.0	100 57 100	0199 190 6 0199 190 6 0199 194 9	2.5	100	0199 192 2	0015 0055 0110
SL2-100M	3000	1800	1 3 6	14.2 35.0 75.0	5.6 13.5 29.2	1.5 2.5 6.0	100 71 100	0199 190 6 0199 192 2 0199 196 5	4.0	100	0199 194 9	0030 0075 0150
SL2-100ML	4000	2400	1 3 6	16.0 49.0 100.0	6.3 19.5 40.7	1.5 4.0 10.0	100 100 100	0199 190 6 0199 194 9 0199 198 1				0040 0110 0220
SL2-150S	1500	1800	1 3 6	12.0 33.5 67.0	4.8 13.5 27.0	1.5 2.5 6.0	100 71 100	0199 190 6 0199 192 2 0199 196 5	4.0	100	0199 194 9	0022 0075 0150
SL2-150M	3000	2700	1 3 6	18.0 53.0 100.0	7.2 21.5 40.7	1.5 4.0 10.0	100 82 100	0199 190 6 0199 194 9 0199 198 1				0040 0150 0300
SL2-150ML	4500	3600	1 3 6	24.0 76.0 132.0	9.4 31.0 53.8	1.5 6.0 10.0	57 77 90	0199 190 6 0199 196 5 0199 198 1[2]	2.5 10.0	100 100	0199 192 2 0199 198 1	0055 0220 0370

1) Required inverter power for F_{NENN}

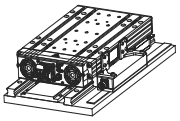
2) Maximum permitted load on cable is 51.6 A

Electrical values refer to sine-shaped commutation and are indicated as effective values or refer to them.

F_1, F_D, v_{Nenn} und I_1, see Sec. 4.1 "SL2-Basic motor data"

F_{peak} = identical to F_{peak} of SL2-Basic

10.3 SL2-Power System motor data



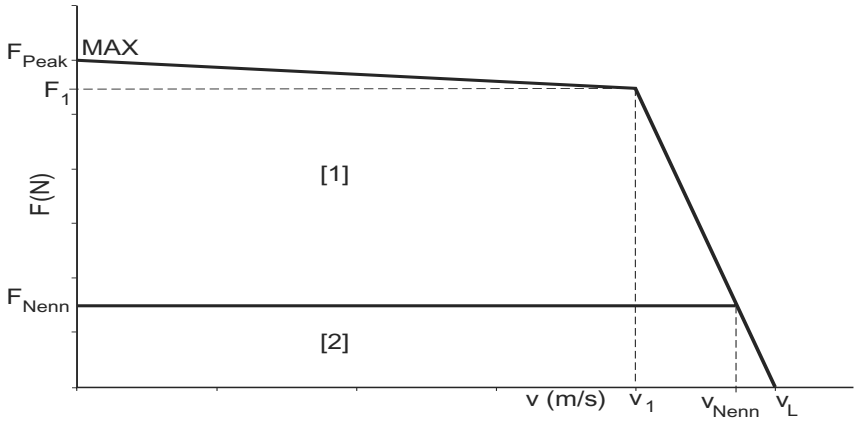


Figure 48: Characteristic curve

[1] = Dynamic limit forces
[2] = Thermal limit forces
F_{Nenn} = Permanent force

Rated characteristics refer to operation at
- **an ambient temperature of 40 °C**
- **an installation altitude of up to 1000 m**

F_1 = Maximum force available up to V_1
F_{Peak} = Maximum force
v_L = Theoretical maximum traveling velocity
v_1 = Velocity up to which force F_1 is available
v_{Nenn} = Velocity up to which the rated force is available
I_{Nenn} = Rated current
I_1 = Current at F_1
I_{Peak} = Maximum current
F_D = Force through magnetic attraction

Motor type	Force					Cable cross section	To cable length s	Part part no.	Cable cross section	To cable length s	Part part no.	MOVIDRIVE® *compact* MCH4_A-xxxx-5A3-4-08[1] MOVIDRIVE® MDX61BMDX61B-xxxx-5-5x3-4-08 xxxx = Power at output stage in [kW]
	F_1 [N]	F_{Nenn} [N]	v_1 [m/]	I_{Peak} [A]	I_{Nenn} [A]	[mm^2]	[m]		[mm^2]	[m]		
SL2-050VS	500	400	- 3 6	- 6.0 13.9	- 3.1 7.6	1.5 1.5	100 100	0590 481 8 0590 481 8				- 0015 0055
SL2-050S	1000	760	1 3 6	4.8 11.8 24.5	2.4 6.1 12.2	1.5 1.5 1.5	100 100 57	0590 481 8 0590 481 8 0590 481 8	2,5	100	0590 483 8	0015 0040 0075
SL2-050M	1500	980	1 3 6	5.9 18.0 33.0	2.6 7.6 14.7	1.5 1.5 2.5	100 100 71	0590 481 8 0590 481 8 0590 483 8	4,0	100	0590 484 6	0015 0055 0110
SL2-050ML	2000	1280	1 3 6	7.8 24.0 48.0	3.3 10.4 20.8	1.5 1.5 4.0	100 57 82	0590 481 8 0590 481 8 0590 484 6	2.5	100	0590 483 8	0022 0075 0150
SL2-100VS	1000	780	1 3 6	4.8 14.2 24.6	2.5 7.3 12.6	1.5 1.5 1.5	100 100 57	0199 190 6 0199 190 6 0199 190 6	2.5	100	0199 192 2	0015 0040 0075
SL2-100S	2000	1570	1 3 6	8.0 25.0 49.0	4.1 12.7 25.5	1.5 1.5 6.0	100 57 100	0199 190 6 0199 190 6 0199 196 5	2.5	100	0199 192 2	0022 0075 0150
SL2-100M	3000	2540	1 3 6	14.2 35.0 75.0	7.9 19.1 41.2	1.5 4.0 10.0	57 100 100	0199 190 6 0199 194 9 0199 198 1	2.5	100	0199 199 2	0040 0110 0220
SL2-100ML	4000	2700	1 3 6	16.0 49.0 100.0	7.1 21.9 45.8	1.5 4.0 10.0	100 82 100	0199 190 6 0199 194 9 0199 198 1	6.0	100	0199 196 5	0040 0150 0300
SL2-150S	1500	2700	1 3 6	12.0 33.5 67.0	7.2 20.3 40.5	1.5 4.0 10.0	100 100 100	0199 190 6 0199 194 9 0199 198 1				0030 0110 0220
SL2-150M	3000	3800	1 3 6	18.0 53.0 100.0	10.1 30.1 57.0	1.5 6.0 10.0	57 100 100	0199 190 6 0199 196 5 0199 198 1[2]	2.5	100	0199 192 2	0055 0150 0370
SL2-150ML	4500	5500	1 3 6	24.0 76.0 132.0	14.4 47.4 82.2	2.5 10.0 10.0	71 100 90	0199 192 2 0199 198 1 0199 198 1[2]	2.5	100	0199 194 9	0110 0220 0450

1) Required inverter power for F_{NENN}

2) Maximum permitted load on cable is 51.6 A

Electrical values refer to sine-shaped commutation and are indicated as effective values or refer to them.

F_1, F_D, v_{Nenn} und I_1, see Sec. 4.1 "SL2-Basic motor data"

F_{peak} = identical to F_{peak} of SL2-Basic

10.4 Maximum forces with MOVIDRIVE® compact and MOVIDRIVE® MDX61B

Rated velocity 1 m/s

The table shows the maximum force that can be reached with each connected servo controller, MOVIDRIVE® *compact* or MOVIDRIVE® MDX61B.

The maximum forces (F_{max}) that can be reached do not depend on SL2-Basic, SL2-Advance System, SL2-Power System.

Motor V_{nenn} = 1 m/s		•MOVIDRIVE® *compact* MCH4_A...-5_3 (400/500 V unit) in SERVO operating modes (P700) •MOVIDRIVE® MDX61B_A...-5_3 (400/500 V units) in SERVO operating modes (P700)													
P [kW]		**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
I_{nenn} [A]		**4**	**5,5**	**7**	**9,5**	**12,5**	**16**	**24**	**32**	**46**	**60**	**73**	**89**	**105**	**130**
I_{max} [A]		**6**	**8,25**	**10,5**	**14,25**	**18,75**	**24**	**36**	**48**	**69**	**90**	**109,5**	**133,5**	**157,5**	**195**
	Systems	F_{max} [N]													
SL2-050VS	Basic Advance Power														
SL2-050S	Basic Advance Power	1300													
SL2-050M	Basic Advance Power	1950													
SL2-050ML	Basic Advance Power	2070	2600												
SL2-100VS	Basic Advance Power	1325													
SL2-100S	Basic Advance Power	2060	2650												
SL2-100M	Basic Advance Power		2490	3050	3970										
SL2-100ML	Basic Advance Power		3060	3710	4800	5300									
SL2-150VS	Basic	1970													
SL2-150S	Basic Advance Power	2270	2880	3490	3900										
SL2-150M	Basic Advance Power		3100	3750	4830	5800									
SL2-150ML	Basic Advance Power			4330	5240	6330	7700								
SL2-200VS	Basic	2090	2700												
SL2-200S	Basic		3050	3710	4810	5200									
SL2-200M	Basic				5150	6450	7800								
SL2-200ML	Basic					6840	8390	10350							
SL2-250VS	Basic	2040	2670	3170											
SL2-250S	Basic			3890	5000	6300									
SL2-250M	Basic				5140	6370	7810	9450							
SL2-250ML	Basic					7020	8620	12300	12600						

Rated velocity 3 m/s

The table shows the maximum force that can be reached with each connected inverter, MOVIDRIVE® *compact* or MOVIDRIVE® MDX61B.

Motor V_{nenn} = 3 m/s		•MOVIDRIVE® *compact* MCH4_A...-5_3 (400/500 V unit) in SERVO operating modes (P700) •MOVIDRIVE® MDX61B_A...-5_3 (400/500 V units) in SERVO operating modes (P700)												
P [kW]		**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
I_{nenn} [A]		**4**	**5,5**	**7**	**9,5**	**12,5**	**16**	**24**	**32**	**46**	**60**	**73**	**89**	**105**	**130**
I_{max} [A]		**6**	**8,25**	**10,5**	**14,25**	**18,75**	**24**	**36**	**48**	**69**	**90**	**109,5**	**133,5**	**157,5**	**195**
	Systems	F_{max} [N]													
SL2-050VS	Basic Advance Power														
SL2-050S	Basic Advance Power	735	955	1175	1300										
SL2-050M	Basic Advance Power			1280	1640	1950									
SL2-050ML	Basic Advance Power			1290	1650	2090	2600								
SL2-100VS	Basic Advance Power		830	1020	1325										
SL2-100S	Basic Advance Power				1680	2090	2560	2650							
SL2-100M	Basic Advance Power					2455	2950	3970							
SL2-100ML	Basic Advance Power						2950	4050	5200	5300					
SL2-150VS	Basic		1065	1280	1650	2000									
SL2-150S	Basic Advance Power					2425	2950	3900							
SL2-150M	Basic Advance Power						3070	4200	5330	5800					
SL2-150ML	Basic Advance Power							4250	5400	7080	7700				
SL2-200VS	Basic				1650	2100	2610	2700							
SL2-200S	Basic						2920	4050	5200						
SL2-200M	Basic							4340	5490	7480	7800				
SL2-200ML	Basic								5680	7510	9430	10350			
SL2-250VS	Basic				2120	2610	3170								
SL2-250S	Basic							4310	5410	6300					
SL2-250M	Basic								5670	7560	9450				
SL2-250ML	Basic									8270	10340	12260	12600		

Rated velocity 6 m/s

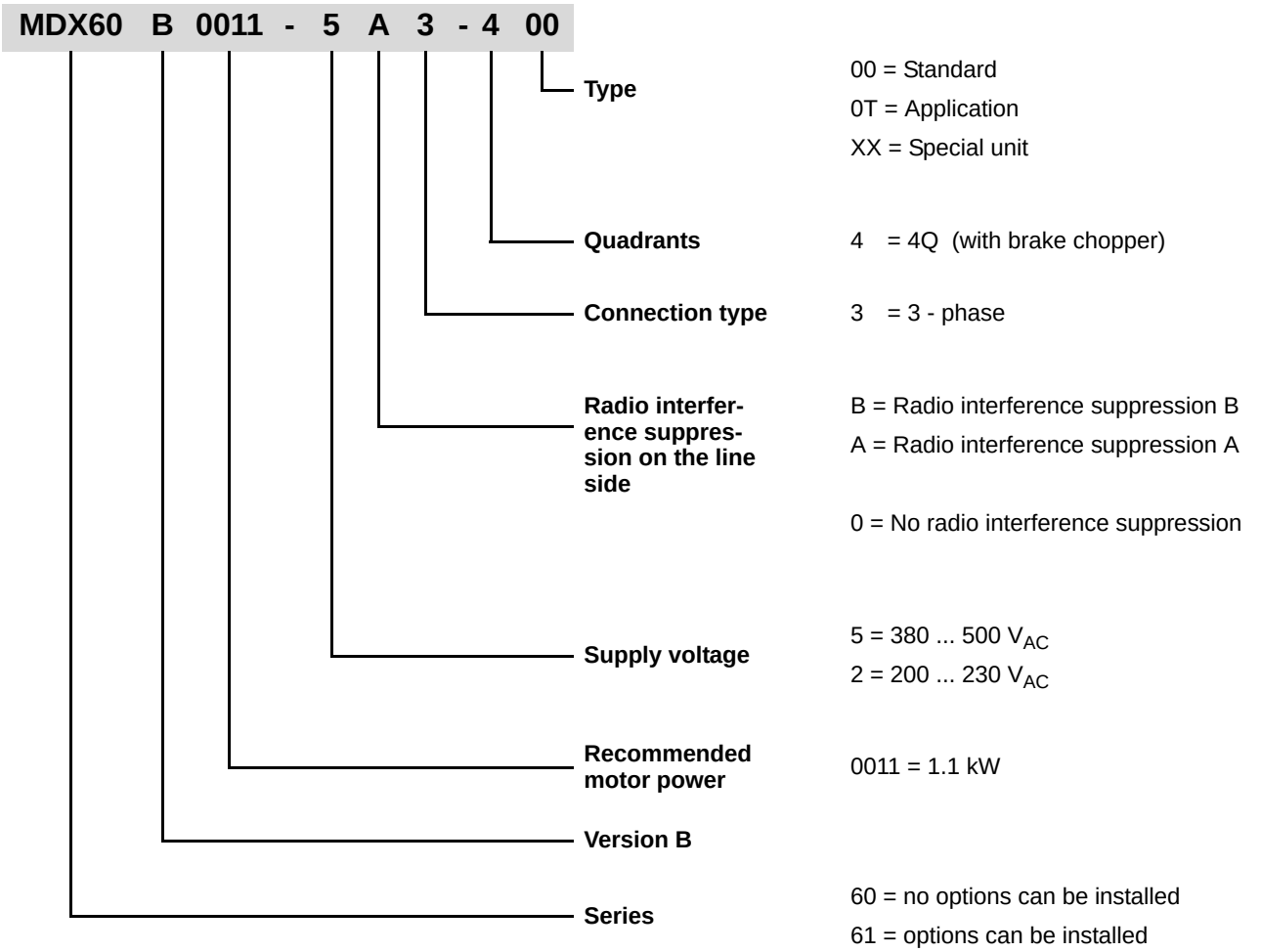
The table shows the maximum force that can be reached with each connected inverter, MOVIDRIVE® *compact* or MOVIDRIVE® MDX61B.

Motor V_{nenn} = 6 m/s		•MOVIDRIVE® *compact* MCH4_A...-5_3 (400/500 V unit) in SERVO operating modes (P700) •MOVIDRIVE® MDX61B_A...-5_3 (400/500 V units) in SERVO operating modes (P700)													
	P [kW]	**0015**	**0022**	**0030**	**0040**	**0055**	**0075**	**0110**	**0150**	**0220**	**0300**	**0370**	**0450**	**0550**	**0750**
	I_{nenn} [A]	**4**	**5,5**	**7**	**9,5**	**12,5**	**16**	**24**	**32**	**46**	**60**	**73**	**89**	**105**	**130**
	I_{max} [A]	**6**	**8,25**	**10,5**	**14,25**	**18,75**	**24**	**36**	**48**	**69**	**90**	**109,5**	**133,5**	**157,5**	**195**
	Systems	F_{max} [N]													
SL2-050VS	Basic Advance Power	320	415	510	650										
SL2-050S	Basic Advance Power			675	840	1040	1280	1300							
SL2-050M	Basic Advance Power					1200	1470	1950							
SL2-050ML	Basic Advance Power						1450	2025	2600						
SL2-100VS	Basic Advance Power				850	1045	1300	1325							
SL2-100S	Basic Advance Power							2025	2600	2650					
SL2-100M	Basic Advance Power							2025	2765	3700	3970				
SL2-100ML	Basic Advance Power								2800	3750	4780	5300			
SL2-150VS	Basic					1220	1470	2000							
SL2-150S	Basic Advance Power							2350	2950	3900					
SL2-150M	Basic Advance Power								3150	4220	5290	5800			
SL2-150ML	Basic Advance Power										5600	6570	7700		
SL2-200VS	Basic							1860	2390	2700					
SL2-200S	Basic									3760	4710	5200			
SL2-250VS	Basic							2150	2730	3170					
SL2-250S	Basic									4150	5180	6130	6300		

10.5 Part numbers for MOVIDRIVE®

The SL2 linear motors can be operated together with MOVIDRIVE® MDX61B or MOVIDRIVE® *compact* MCH servo controllers from SEW-EURODRIVE.

MOVIDRIVE® MDX61B unit designation :


MDX60 B 0011 - 5 A 3 - 4 00
Type
00 = Standard
0T = Application
XX = Special unit
Quadrants
4 = 4Q (with brake chopper)
Connection type
3 = 3 - phase
Radio interference suppression on the line side
B = Radio interference suppression B
A = Radio interference suppression A
0 = No radio interference suppression
Supply voltage
5 = 380 ... 500 V_AC
2 = 200 ... 230 V_AC
Recommended motor power
0011 = 1.1 kW
Version B
Series
60 = no options can be installed
61 = options can be installed

For the connection of the AL1H motor encoder, the HIPERFACE® encoder card type DEH11B option with the part number 8243107 must always be used.

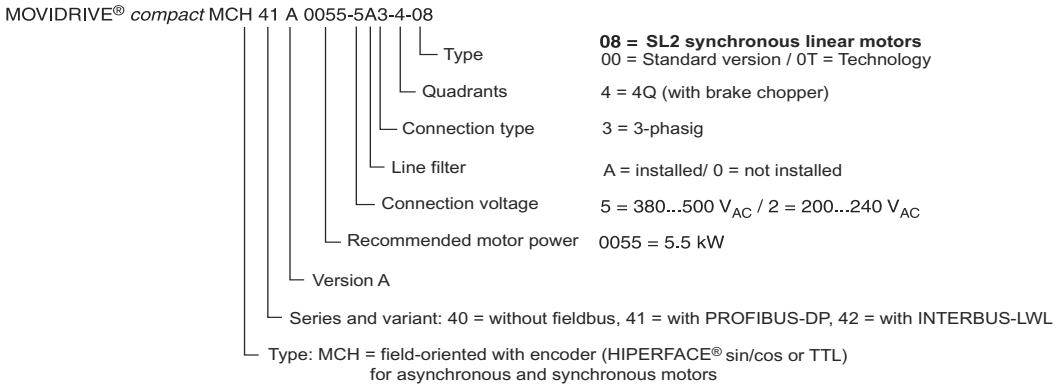
For more information, refer to the MOVIDRIVE® B system manual.

Assignment of part numbers

MOVIDRIVE® MDX61B

Unit part number	MOVIDRIVE® MDX61B
08286256	MDX61B0005-5A3-4-08
08286264	MDX61B0008-5A3-4-08
08286272	MDX61B0011-5A3-4-08
08286280	MDX61B0014-5A3-4-08
08286299	MDX61B0015-5A3-4-08
08286302	MDX61B0022-5A3-4-08
08286310	MDX61B0030-5A3-4-08
08286329	MDX61B0040-5A3-4-08
08286337	MDX61B0055-5A3-4-08
08286345	MDX61B0075-5A3-4-08
08286353	MDX61B0110-5A3-4-08
08286361	MDX61B0150-503-4-08
08286388	MDX61B0220-503-4-08
08286396	MDX61B0300-503-4-08
08286418	MDX61B0370-503-4-08
08286426	MDX61B0450-503-4-08
08286434	MDX61B0550-503-4-08
08286442	MDX61B0750-503-4-08
08286450	MDX61B0900-503-4-08
08286469	MDX61B1100-503-4-08
08286477	MDX61B1320-503-4-08

MOVIDRIVE® compact MCH unit designation


MOVIDRIVE® compact MCH 41 A 0055-5A3-4-08
Type
08 = SL2 synchronous linear motors
00 = Standard version / 0T = Technology
Quadrants
4 = 4Q (with brake chopper)
Connection type
3 = 3-phasig
Line filter
A = installed/ 0 = not installed
Connection voltage
5 = 380...500 V AC / 2 = 200...240 V AC
Recommended motor power
0055 = 5.5 kW
Version A
Series and variant: 40 = without fieldbus, 41 = with PROFIBUS-DP, 42 = with INTERBUS-LWL
Type: MCH = field-oriented with encoder (HIPERFACE® sin/cos or TTL)
for asynchronous and synchronous motors

You will find additional information in the MOVIDRIVE®*compact* system manual.

Assignment of part numbers

MCH40A without fieldbus

Unit part number	Device designation
828 085 1	MCH40A0015-5A3-4-08
828 087 8	MCH40A0022-5A3-4-08
828 088 6	MCH40A0030-5A3-4-08
828 089 4	MCH40A0040-5A3-4-08
828 090 8	MCH40A0055-5A3-4-08
828 091 6	MCH40A0075-5A3-4-08
828 092 4	MCH40A0110-5A3-4-08
828 093 2	MCH40A0150-503-4-08
828 094 0	MCH40A0220-503-4-08
828 095 9	MCH40A0300-503-4-08
828 096 7	MCH40A0370-503-4-08
828 097 5	MCH40A0450-503-4-08
828 098 3	MCH40A0550-503-4-08
828 099 1	MCH40A0750-503-4-08

MCH41A with Profibus DP

Unit part number	Device designation
828 100 9	MCH41A0015-5A3-4-08
828 101 7	MCH41A0022-5A3-4-08
828 102 5	MCH41A0030-5A3-4-08
828 103 3	MCH41A0040-5A3-4-08
828 104 1	MCH41A0055-5A3-4-08
828 106 8	MCH41A0075-5A3-4-08
828 107 6	MCH41A0110-5A3-4-08
828 108 4	MCH41A0150-503-4-08
828 109 2	MCH41A0220-503-4-08
828 110 6	MCH41A0300-503-4-08
828 111 4	MCH41A0370-503-4-08
828 112 2	MCH41A0450-503-4-08
828 113 0	MCH41A0550-503-4-08
828 114 9	MCH41A0750-503-4-08

MCH42A with Interbus LWL

Unit part number	Device designation
828 115 7	MCH42A0015-5A3-4-08
828 116 5	MCH42A0022-5A3-4-08
828 117 3	MCH42A0030-5A3-4-08
828 118 1	MCH42A0040-5A3-4-08
828 120 3	MCH42A0055-5A3-4-08
828 121 1	MCH42A0075-5A3-4-08
828 123 8	MCH42A0110-5A3-4-08
828 124 6	MCH42A0150-503-4-08
828 125 4	MCH42A0220-503-4-08
828 126 2	MCH42A0300-503-4-08
828 127 0	MCH42A0370-503-4-08
828 128 9	MCH42A0450-503-4-08
828 129 7	MCH42A0550-503-4-08
828 130 0	MCH42A0750-503-4-08

10.6 Technical data of the absolute linear measuring system AL1H

The absolute linear measuring system corresponds to the linear measuring system from SICK / Stegmann.

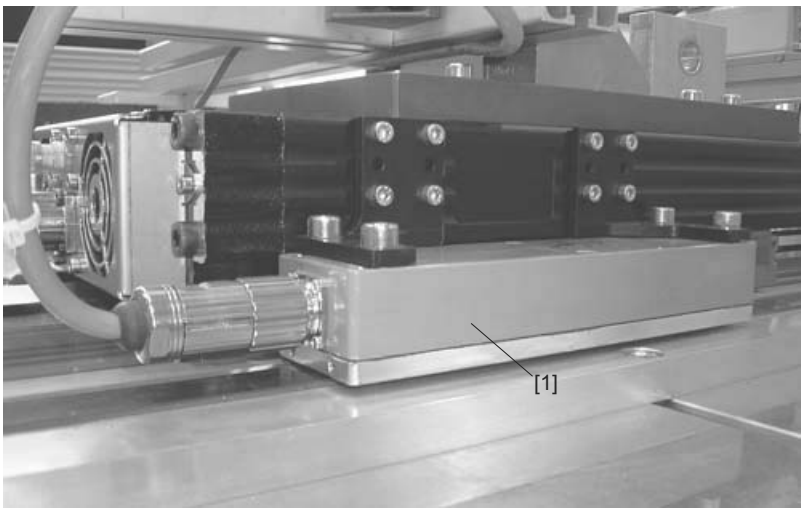


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Figure 49: AL1H linear measuring system [1]

Technical data and characteristic features to DIN 32878:

General data	
Measuring length	max. 40 m
Magnetic tape length (measuring length)	+130 mm[1)]
Reproducibility	± 10 µm
Measurement accuracy	typ. ± 0.3 mm/m at 20 °C
Max. traveling velocity	6 m/s
Temperature expansion coefficient T_k steel band	16 µm/°C/m
Position tolerances and dimensions	See scale drawing
Mass • Sensor part • Magnetic tape	 0.685 kg 0.160 kg/m
Materials • Sensor parts • Magnetic tape • Stainless steel band	 AlmgSiPbF28 Tromaflex 928 No. 1.4435
Working temperature range	0 °C ... +70 °C
Operating temperature range	–20 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C
Enclosure	IP65

1) Constant due to technical limitations

HIPERFACE® interface data

General data	
Cycle length	5 mm ±3 %
Position resolution (cycle length/32 = 5 mm/32)	156.25 µm
Initialization time	2500 ms
Supply voltage	7 V 12 V
Max. current consumption without load	650 mA
Interface signals	
Process data channel • SIN, COS • REFSIN, REFCOS	 0.9 Vpp ... 1.1 Vpp 2.2 V 2.8 V
Non-linearity within a sine, cosine cycle, differential non-linearity	± 50 µm
Parameter channel	to EIA 485

External magnetic fields should not pass the surface of the material measure 64 mT (640 Oe; 52 kA/m) as this could cause irreparable damage to the coding on the material measure. Magnetic fields > 1mT on the measuring system influence the measuring accuracy.

Scale drawings and position tolerances

General tolerances to DIN ISO 2768-mk

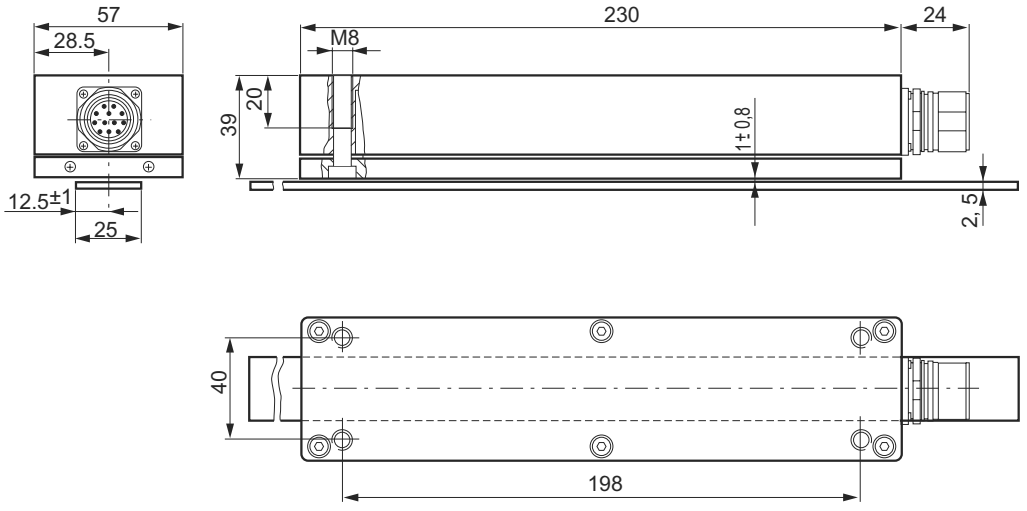

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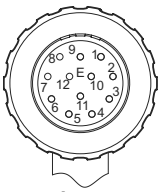
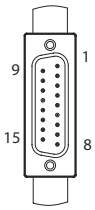
Figure 50: Scale drawings and position tolerances

Connection assignment

Connection assignment of the AL1H linear measuring system on MOVIDRIVE® compact MCH / MOVIDRIVE® MDX..B

Encoder end					Connection MOVIDRIVE® *compact* MCH MOVIDRIVE® MDX..B	
Plug connector	**Contact no.**	**Description**	**Cable core color**	**Description**	**Contact no.**	**Plug connector**
ASTA021FR **198 921 9** 12-pin with socket contacts  **View X**	1	S3 (cosine -)	Blue (BU)	S3 (cosine -)	9	Sub-D 15-pin MOVIDRIVE® *compact* MCH  MOVIDRIVE® B **View Y**
	2	Data (+)	Black (BK)	Data (+)	4	
	3	Unassigned		Unassigned	3	
	4	Unassigned		Unassigned	5	
	5	S2 (sine +)	Yellow (YE)	S2 (sine +)	2	
	6	S4 (sine -)	Green (GN)	S4 (sine -)	10	
	7	Data (-)	Violet (VT)	Data (-)	12	
	8	S1 (cosine +)	Red (RD)	S1 (cosine +)	1	
	9	Unassigned		Unassigned	6	
	10	GND	Gray/pink (GY/PK) / pink (PK)	GND	8	
	11	Unassigned		Unassigned	7	
	12	U_S	Gray (GY)	U_S	15	
		Unassigned	Unassigned	Unassigned	11	
		Unassigned	Unassigned	Unassigned	13	
		Unassigned	Unassigned	Unassigned	14	

Feedback cables and extension cables for the AL1H linear measuring system are the same for MOVIDRIVE® *compact* MCH and MOVIDRIVE® MDX..B.

Function	SEW part number	Description
Linear sensor	1332 8263	AL1H, HIPERFACE®, 12-pin M23 unit connector
Measuring tape	1332 8271	Magnet tape with adhesive tape
Mount-on components	1332 8301	L230 LinCoder® mount-on components for SL2-Advance System / SL2-Power System cooling unit
Feedback cable	1332 8328	Encoder cable for MOVIDRIVE® compact, approved for use with cable carriers
	0595 1518	Encoder cable for MOVIDRIVE® B, approved for use with cable carriers
Extension cable for feedback cable	0199 5405	Cable carrier installation

Additional information

Data for the AL1H linear measuring system in this documentation were based on the data available from SICK / Stegmann at the time of printing. The design and units are subject to change. The data from SICK / Stegmann apply.

Current information can be found in

- the operating instructions from SICK / Stegmann, which are enclosed with the linear motor

or

- at www.stegmann.de

Encoder mount-on components

For the SL2-Advance System and SL2-Power System, mount-on components are available for these encoders under the part number 13328301.

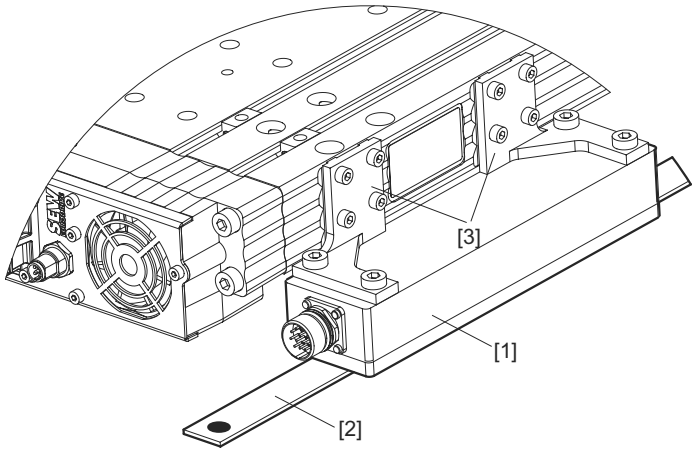


Figure 51: AL1H: Linear sensor and subsegment of the measuring tape

[1] Linear sensor
[2] Measuring tape
[3] Encoder mount-on components

10.7 Linear guide systems for SL2-Advance and SL2-Power System

The following guide systems can be installed on the SL2-Advance System and the SL2-Power System primaries.

SL2 - P050VS/S/M/ML Advance/Power

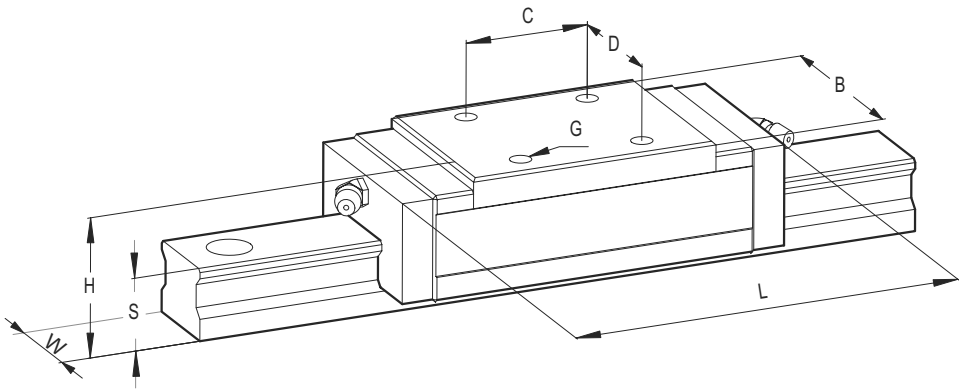


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Figure 52: Guide systems

Guide systems (standard mounting) to DIN 645-1 version 3M

$L_{max.}$ [1]	B	C	D	H	W	$S_{max.}$	G
			[mm]				
SL2-P050VS = 94 SL2-P050S = 133 SL2-P050M = 144 SL2-P050ML = 190	48	35	35	40	23	24	M6x8

1) The max. length is dependent on the size

Manufacturer	Size
THK	HSR 25 R (standard) SHS 25 R (with ball chain)
INA	KUVE 25 H KUVE 25 B KT H (with Quadspacer)
NSK	LAH 25 ANZ
Schneeberger	BMC 25
HIWIN	HGH25CA

SL2 - P100VS/S/M Advance/Power

Guide systems (standard mounting) to DIN 645-1 version 3M

$L_{max.}$ [1]	B	C	D	H	W	$S_{max.}$	G
			[mm]				
SL2-P100VS = 94 SL2-P100S = 140 SL2-P100M = 140	60	40	40	45	28	25	M8x10

1) The max. length is dependent on the size

Manufacturer	Size
THK	HSR30R SHS 30R (with ball chain)
INA	KUVE 30 H

SL2 - P100ML
Advance/Power

Guide systems (standard mounting, long guide carriages) to DIN 645-1 version 3L

$L_{max.}$	B	C	D	H	W	$S_{max.}$	G
[mm]							
170	60	60	40	45	28	25	M8x10

Manufacturer	Size
THK	HSR30LR SHS 30LR (with ball chain)
INA	KUVE 30 HL

SL2 - P150S/ML
Advance/Power

Guide systems (standard mounting) to DIN 645-1 version 3M

$L_{max.}$	B	C	D	H	W	$S_{max.}$	G
[mm]							
170	70	50	50	55	34	29,8	M8x10

Manufacturer	Size
THK	HSR 35R SHS 35R (with ball chain)
INA	KUVE 35 H
NSK	LAH 35 ANZ
Schneeberger	BMC 35
HIWIN	HGH35CA

SL2 - P150M
Advance/Power

Guide systems (standard mounting) to DIN 645-1 version 3L

$L_{max.}$	B	C	D	H	W	$S_{max.}$	G
[mm]							
250	70	72	50	55	34	29,8	M8x10

Manufacturer	Size
THK	HSR 35LR SHS 35LR (with ball chain)
INA	KUVE 35 HL
NSK	LAH 35 BNZ
Schneeberger	BMD 35
HIWIN	HGH35HA

11 Declaration of Conformity

11.1 SL2 Synchronous Linear Motors

DIN EN ISO 9001

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Str. 42
D-76646 Bruchsal

Konformitätserklärung

für Linearmotoren
nach ISO/IEC Guide 22, nach DIN EN 45014 Seite 1/1

Declaration of conformity

for linear motors
in accordance with ISO/IEC Guide 22, in accordance with DIN EN 45014 Page 1/1

SEW-EURODRIVE erklärt die Konformität des Produktes
declares that the following product

Typ / Model Synchrone-Linearmotor Reihe SL2-...

Ab.-Nr./ AB.-No.

mit der
are conform with the

Niederspannungsrichtlinie 73/23EG
Low Voltage Directive 73/23EC
und der / and the
EMV-Richtlinie 89/336EG
EMC Directive 89/336EC

auch in Verbindung mit
also when combined with

Optionen und Zubehör
options and asseccories

Angewandte harmonisierte Normen: EN 60204-1
applied harmonized standards: EN 50081-1
EN 50082-2

Die Einhaltung der EMV-Richtlinie setzt einen EMV-gerechten Einbau der Produkte, die Beachtung der spezifischen Installationshinweise und der Produktdokumentation voraus. Dies wurde an bestimmten Anlagekonfigurationen nachgewiesen.

Adherence to the EMC-Directive requires EMC-compliant installation of the products and compliance with the specific installation instructions and product documentation.
Conformity with these Directives was established based on certain plant configurations.

SEW-EURODRIVE GmbH & Co KG

Bruchsal , 25.02.2004 ppa.

E. Dörr
Funktion: Vertriebsleitung / Deutschland
Function: Head of Sales / Germany

Ort und Datum der Ausstellung
Place and date of issue

12 Appendix

12.1 Change index

The following additions and changes have been made to the previous edition of the "SL2 Synchronous Linear Motors" operating instructions (publication number: 11253818, Edition 03/2004):

General additions and corrections.

Product Description and Overview of Types

- System environment
- System components for SL2-Advance System and SL2-Power System
- Type code
- Scope of delivery for system components

Transportation and Storage

- Transportation of the primary for the SL2-Advance System / SL2-Power System

Mechanical Installation

- Installation of the SL2-Basic
- Installation of the SL2-Advance System and SL2-Power System
- Installation of SL2 secondaries
- Installation of the AL1H measuring system
- Mechanical load capacity of the SL2-Advance System and SL2 -Power System
- Installation of customer components on primary

Electrical Installation

- SL2-Basic electrical connection
- SL2-Advance System and SL2 -Power System electrical connection
- Prefabricated cables for SL2-Advance System and SL2-Power System

Technical Data

- SL2-Basic motor data
- SL2-Advance System motor data
- SL2-Power System motor data
- Maximum forces with MOVIDRIVE® *compact* MCH and MOVIDRIVE® MDX61B
- Part numbers for MOVIDRIVE® *compact* MCH
- Part numbers for MOVIDRIVE® MDX61B
- Technical data of the absolute linear measuring system AL1H
- Linear guide systems for SL2-Advance and SL2-Power System

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	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
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	Mumbai	SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza Andheri Kurla Road, Andheri (E) Mumbai	Tel. +91 22 28348440 Fax +91 22 28217858 salesmumbai@seweurodriveindia.com

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Morocco			
Sales	**Casablanca**	S. R. M. Société de Réalisations Mécaniques 5, rue Emir Abdelkader 05 Casablanca	Tel. +212 2 6186-69 + 6186-70 + 6186-71 Fax +212 2 6215-88 srm@marocnet.net.ma

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New Zealand			
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	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
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Peru			
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Poland			
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Portugal			
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Romania			
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Russia			
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Slovakia			
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Slovenia			
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	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

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Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 41717-17 Fax +41 61 41717-00 http://www.imhof-sew.ch info@imhof-sew.ch

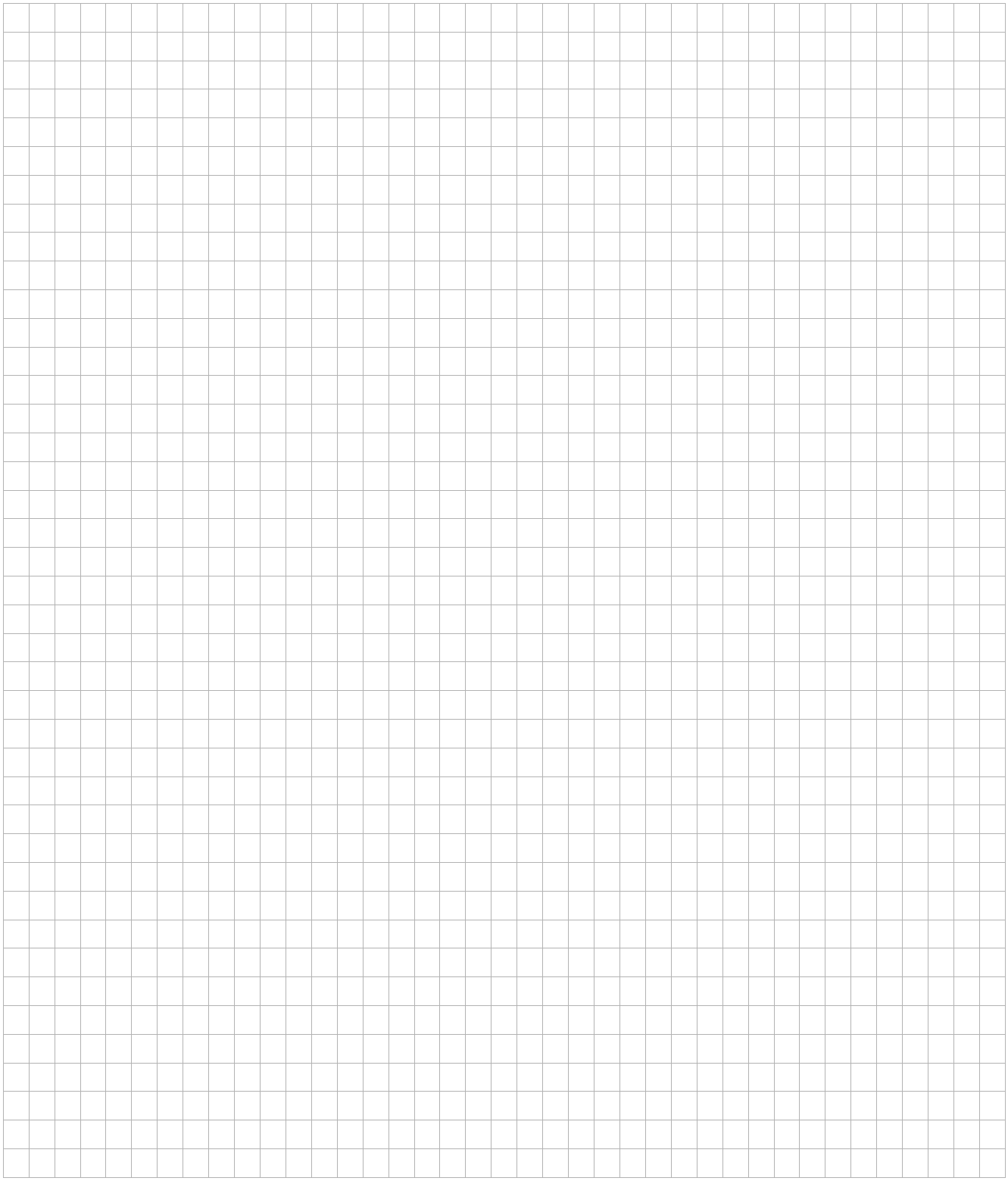
Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.co.th

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn EI Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri Sirketi Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 + 216 4419164 + 216 3838014 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 sewventas@cantv.net sewfinanzas@cantv.net



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